

Report for BIPT

Future regulation of wireless access in
the 790MHz–3400MHz spectrum bands

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Executive summary

Following a specific request from the Belgian Government, BIPT is reviewing its spectrum policy framework regarding the use of 790MHz–3400MHz spectrum bands. The main aim of this review is to recommend changes to the existing regulation that will not only make it more ‘future proof’; but will also help to promote:

- market development (to the benefit of the end user)
- efficient use of spectrum
- visibility for market players and compliance with EU framework.

On February 2009, BIPT commissioned Analysys Mason and Hogan & Hartson to support this current review and to provide independent recommendations.

The study was last updated in January 2010 following national and European spectrum developments, which includes new proposals from the Minister in November and December 2009.

In the table below, we present the nine, main topics that define the scope of our work, the most relevant questions associated to these topics, and our main recommendations.

| <i>Topic</i> | <i>Key relevant questions</i> | <i>Main recommendations</i> |
|---|---|--|
| Topic 1: Promotion of mobile broadband | What are the main means to promote the take-up of mobile broadband in Belgium? | Promote and encourage entry of new mobile players (T1-1) Include mobile broadband offers in the BIPT comparison tool (T1-2) Allow terminal subsidy and bundling (T1-3) |
| Topic 2: Flexibility in mobile authorisations | How can authorisations become more flexible and which aspects should be taken into account? | Consider amending the legal framework (T2-1) Introduce greater flexibility into current authorisations (T2-2) Introduce greater flexibility into new authorisations (T2-3) Introduce spectrum trading and review the current Belgian legal framework in order to include notification to BIPT when spectrum is traded in high frequency bands (T2-4) |
| Topic 3: Digital dividend | To what services, how and when should the 790–862MHz sub-band be awarded? | Allocate the sub-band to telecoms services (T3-1) Reach a decision through cooperation between competent regulators (T3-2) Develop a new spectrum plan for UHF bands IV and V (T3-3) Adopt a cooperation agreement with the Communities regarding coordination of broadcasting frequencies in order to facilitate international coordination to free the sub-band (T3-4) Award spectrum on national basis in 2011 (T3-5) |

| <i>Topic</i> | <i>Key relevant questions</i> | <i>Main recommendations</i> |
|---|---|---|
| Topic 4: Assignment mechanisms | What are the main assignment mechanisms used worldwide and what are their advantages and disadvantages? | No specific recommendation (a description and comparison of main assignments mechanisms are provided in the core of the document) |
| Topic 5: Renewal of 2G authorisations | When and how should 2G authorisations be renewed? What are the conditions that should be changed? | Award the 900MHz spectrum as early as possible, and award the 1800MHz spectrum at a later date potentially coupled with the 2.6GHz band (T5-1) Extend current 2G authorisations until 2015, and then re-award 900MHz and 1800MHz separately (T5-2) Set the price for 2G authorisation renewal until 2015 based on historical prices and calculate the reserve price for 900MHz and 1800MHz spectrum award depending on supply and demand for this spectrum (T5-3) |
| Topic 6: Assessment of frequency assignment to the fourth 3G player | When should a fourth, 3G licence be awarded? Under what conditions should this be awarded? | Reserve for a potential new mobile operator a 2x5MHz block in the 2.1GHz band and a block of 2x5MHz in lower band frequencies (T6-1) Launch the award mechanism for a 3G authorisation as soon as possible (T6-2) Award the fourth 3G authorisation at a price of EUR20 833 per MHz and per month (T6-3) |
| Topic 7: 2.5–2.7GHz | How and when should the 2.6GHz band be awarded? | Assign the spectrum based upon the ‘fixed’ plan of the ECC Decision (i.e. 2500–2570MHz and 2620–2690MHz for FDD and 2570–2620MHz for TDD) (T7-1) Wait for a real demand for spectrum before awarding 2.6GHz authorisation (T7-2) Award the 2.6GHz spectrum by using a Combinatory Clock Auction (T7-3) Use a lower reserve price than the suggested EUR500 000 per MHz, especially for unpaired spectrum (T7-4) |
| Topic 8: Low-power GSM in the 1800MHz band | Is there an interest to award 1800MHz to local GSM systems? What are the best practices related to these systems? | Use the DECT guard band for local GSM networks (T8-1) Make available the spectrum using a licence exempt regime (T8-2) |
| Topic 9: Microwave links | Do microwave fees need to be reduced in Belgium? | Reduce microwave links tariffs significantly (T9-1) |

Figure 1 Summary of topic key relevant questions and main recommendations [Source: Analysys Mason, Hogan&Hartson]

We illustrate in the figure below the recommended timing for the award of the main spectrum bands.

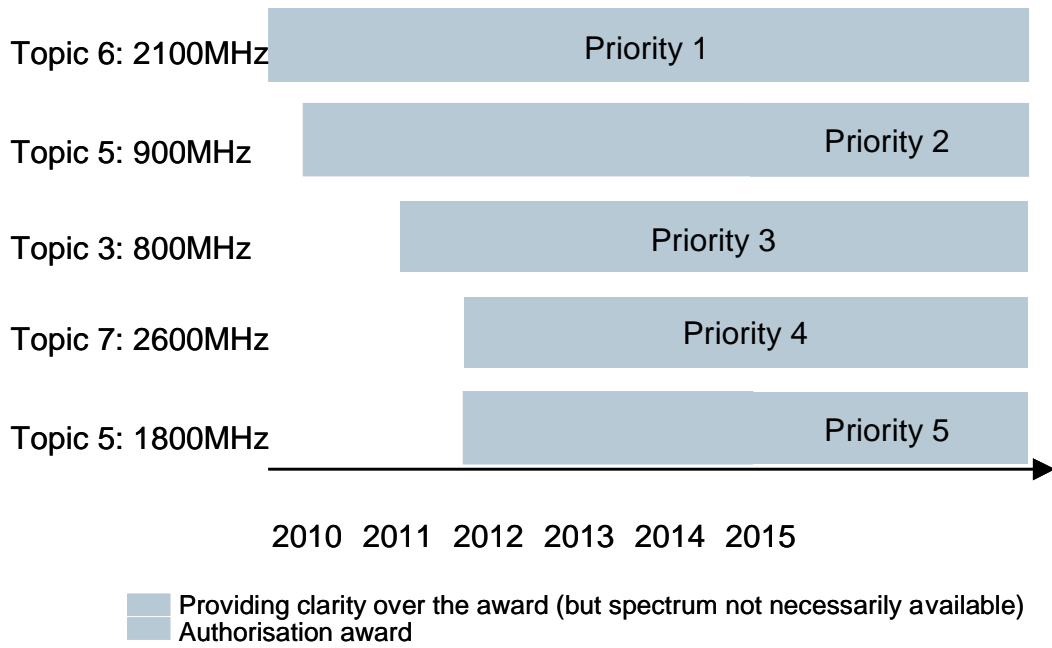


Figure 2: Proposed timing for different awards [Source: Analysys Mason]

Priority 1 Award the remaining 2.1GHz spectrum band as soon as possible (i.e. in the first half of 2010) in order to identify if there will be a potential fourth entrant in the market.

There should also be clear communication related to spectrum reservation of lower-band blocks (i.e. 900MHz) for a potential new entrant.

Priority 2 Provide clarity (in 2010) over the award of the 900MHz spectrum (even though this spectrum might not become available before 2015) .

Priority 3 Award the digital dividend spectrum during 2010–2011, after providing clarity over the award of the 900MHz spectrum .

This would allow operators to have greater certainty over their ‘lower-band spectrum’, which is crucial for network rollout and coverage.

Priority 4 Award the 2.6GHz spectrum band between 2011 and 2012, as there is currently no real demand for this spectrum.

Priority 5 Provide clarity over the award of the 1800MHz spectrum band as close as possible to the award of the 2.6GHz spectrum band and award the 1800MHz spectrum in 2015 as:

- These bands have been identified as being suitable for deploying 4G/LTE networks.
- This will give operators time to assess additional spectrum required for additional capacity above that which they already own in the low-frequency spectrum bands

0 Introduction

0.1 Context and objectives

Following a specific request from the Belgian Government, BIPT is reviewing its spectrum policy framework regarding the use of the 790MHz–3400MHz bands. The main aim of this review is to recommend changes to the existing regulation that will not only make it more ‘future proof’ but will also help to promote:

- market development (to the benefit of the end user)
- efficient use of spectrum
- visibility for market players and compliance with EU framework.

On February 2009, BIPT commissioned Analysys Mason and Hogan & Hartson to support this current review and to provide independent recommendations. We understand that the scope of work of BIPT terms of reference was prepared on the basis of the Government questions to BIPT.

The study was updated in January 2010 following national and European spectrum developments, which includes new proposals from the Minister in November and December 2009.

BIPT has already performed four public consultations during 2009, of which one is still pending:

- a consultation launched in February 2009, related to the future regulation of wireless access in the 790MHz–3400MHz spectrum bands
- a consultation launched in April 2009 on the Royal Decree modifying the decrees related to the GSM, DCS-1800 and third-generation authorisations
- a consultation launched in November 2009, related to the amendment of Article 30 of the 2005 Electronic Communications Law in order to introduce a new harmonised framework and methodology for spectrum fees
- a consultation launched in December 2009, related to the modification of Article 30 (spectrum fees) and Article 51 (national roaming) of the 2005 Electronic Communications Law, the draft Royal Decree amending the 7 March 1995 Royal Decree related to GSM networks, the 24 October 1997 Royal Decree related to DCS-1800 networks, the 18 January 2001 Royal Decree related to UMTS networks and the draft Royal Decree related to wireless access to the 2500-2690MHz frequency band (still pending).

The responses to the completed public consultations, as well as brainstorming sessions with BIPT, have been key inputs to our work.

Note: In this updated version of our report, we have sought to update all main analyses with latest market data. However, given the limited time available for our assignment and the difficulty in obtaining consistent current pan-European data, some analyses were not fully updated. However, we believe that this does not affect our conclusions and recommendations.

0.2 Scope of work

The scope of our study is to focus on the following nine main topics (we also provide below a list of the most-relevant questions):

- **Topic 1: Promotion of mobile broadband** – What are the main market issues and what are the means that could be used to promote the take-up of mobile broadband in Belgium?
- **Topic 2: Flexibility in mobile authorisations** – How can authorisations become more flexible and which aspects should be taken into account?
- **Topic 3: Digital dividend** – What are the potential uses of the 790–862MHz sub-band? To what, how and when should this spectrum be awarded?
- **Topic 4: Assignment mechanisms** – What are the main assignment mechanisms used worldwide and what are their advantages and disadvantages?
- **Topic 5: Renewal of 2G authorisations** – When and how should 2G authorisations be renewed? What are the conditions that should be changed?
- **Topic 6: Assessment of frequency assignment to the fourth 3G player** – When should a fourth, 3G licence be awarded? Under what conditions should this be awarded?
- **Topic 7: 2.5–2.7GHz band** – How and when should the 2.6GHz band be awarded?
- **Topic 8: Low power/private/local GSM systems in the 1800MHz band** – Is there an interest to award 1800MHz to local GSM systems? What are the best practices related to these systems?
- **Topic 9: Microwave links** – Do microwave fees need to be reduced in Belgium?

As presented in the figure below, each of these topics can be linked to the strategic objectives of BIPT.

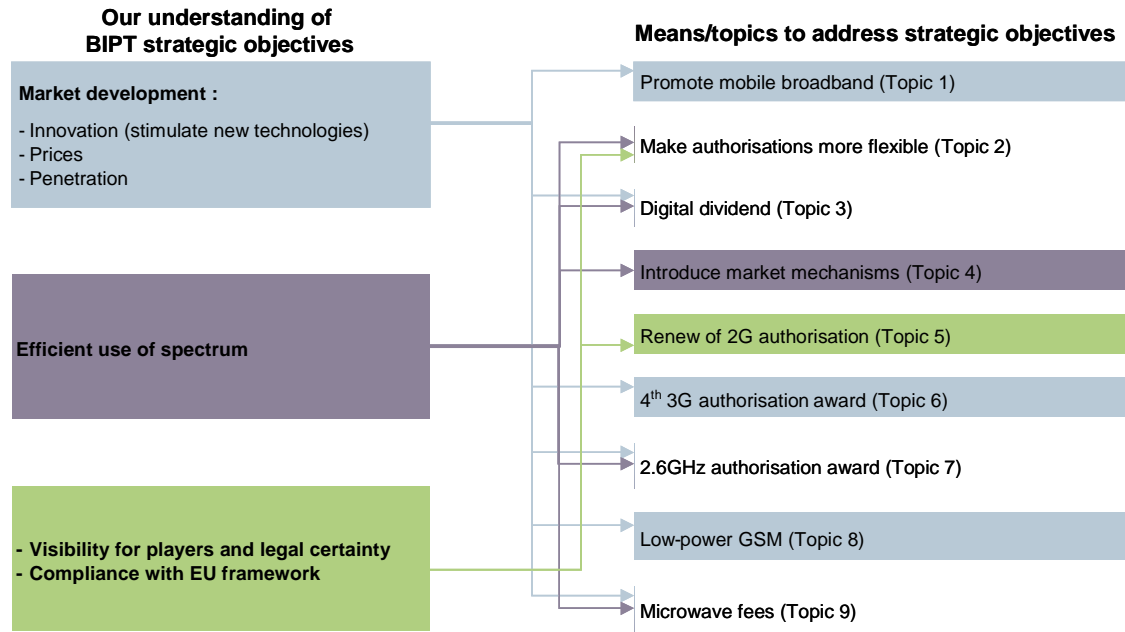


Figure 0.1: Link between BIPT’s strategic objectives and the nine topics of the study¹ [Source: Analysys Mason]

It should be noted that the scope of our study, is focused on spectrum rather than being an exhaustive assessment of all market impacts arising from the recommended policies. Therefore, our work took account of the direct impact of spectrum policies on mobile services but did not fully consider potential wider impacts on the fixed market or on integrated operators.

It should be also noted that this report does not analyse the impact of the evolution of frequency emissions limits.

0.3 National and European developments since July 2009

We present below, the main national and European developments since July 2009 (date of our previous final report from which this document is an update).

0.3.1 National developments

Since July 2009, the following developments in Belgium are relevant to this study.

| | |
|---|--|
| <p>20 July 2009 Brussels Court of Appeal Decision²</p> | <p>The Brussels Court of Appeal quashed the 25 November 2008 BIPT Decision³ that opposed the tacit renewal of Belgacom Mobile’s 2G authorisation.</p> |
|---|--|

¹ The terms authorisation and licence have the same meaning in this report.

² Brussels Court of Appeal Decision R.G. N°.2008/AR/3162.

- 22 September 2009 Brussels Court of Appeal Decision*⁴ The Brussels Court of Appeal quashed the 25 November 2008 BIPT Decision⁵ that opposed the tacit renewal of Mobistar’s 2G authorisation.
- 24 December 2009 BIPT Council Decision withdrawing the 25 November 2008 Decision concerning Base 2G authorisation*⁶ On 24 December 2009, after having conducted a consultation, BIPT adopted a decision withdrawing the 25 November 2008 Decision concerning Base 2G authorisation.⁷
- 18 November 2009 Consultation*⁸ The consultation was related to the amendment of Article 30 of the 2005 Electronic Communications Law in order to introduce a new harmonised framework and methodology for spectrum fees (spectrum prices for the grant of authorisations and renewal fees) for GSM 900, DCS 1800, UMTS and 2600 MHz frequencies. The process closed on 16 December 2009. Comments were received from Belgacom, Mobistar and KPN.
- 24 December 2009 Consultation*⁹ The Consultation is related to the modification of Article 30 and Article 51 of the 2005 Electronic Communications Law, the draft Royal Decree amending the 7 March 1995 Royal Decree related to GSM networks, the 24 October 1997 Royal Decree related to DCS 1800 networks, the 18 January 2001 Royal Decree related to UMTS networks and the draft Royal Decree related to wireless access to the 2500-2690MHz frequency band. Contributions are due on 21 January 2010.

³ BIPT Council Decision dated 25 November 2008 concerning the opposition to the tacit renewal and exploitation of two GSM networks (Mobistar and Proximus) and the network of the DCS 1800 operator (Base).

⁴ Brussels Court of Appeal Decision A.R. N°. 2008/AR/3257

⁵ BIPT Council Decision dated 25 November 2008 concerning the opposition to the tacit renewal and exploitation of two GSM networks (Mobistar and Proximus) and the network of the DCS 1800 operator (Base).

⁶ BIPT Council Decision dated 24 December 2009 concerning the withdrawal of BIPT Council Decision dated 25 November 2008 concerning the opposition to the tacit renewal and exploitation of the network of the DCS 1800 operator (Base).

⁷ On 1 June 2009, Base S.A. changed its company name to KPN Group Belgium S.A.. Since its telecommunications activities are still branded under the name of Base, we will use the name Base in this study.

⁸ BIPT Council Consultation at the request of the Ministry of Enterprise and Simplification dated 18 November 2009 related to the amendment of Article 30 of the 2005 Electronic Communications Law.

⁹ BIPT Council Consultation at the request of the Ministry of Enterprise and Simplification dated 24 December 2009 related to the modification of Article 30 and Article 51 of the 2005 Electronic Communications Law, the draft Royal Decree amending the 7 March 1995 Royal Decree related to GSM networks, the 24 October 1997 Royal Decree related to DCS 1800 networks, the 18 January 2001 Royal Decree related to UMTS networks and the draft Royal Decree related to radio electric access to the 2500-2690 MHz frequency band.

0.3.2 European developments

At the European level, the following developments since July 2009 are relevant to this study:

*Adoption of the 2009 EU Regulatory Framework*¹⁰

Two years after the European Commission presented its proposals in November 2007, the review of the EU 2002 Regulatory Framework for electronic communications was finalised by the European Parliament and the Council.

The final texts were adopted in November 2009:

- Directive amending the Framework, Authorisation and Access Directives¹¹
- Directive amending the Universal Service Directive, the e-Privacy Directive and the Regulation on consumer protection¹²
- Regulation establishing the Body of European Regulators in Electronic Communications (BEREC) and the Office¹³

These texts were published in the EU official journal on 18 December 2009. The amended directives must be transposed into national laws by May 2011.

Publication of the Amended GSM Directive and harmonised UMTS Decision

On 20 October 2009, a Directive amending the GSM Directive (“the Amended GSM Directive”) ¹⁴ was published in the EU official journal. Under this directive, Member States shall make the 900MHz frequency band available for GSM and UMTS systems, as well as for other terrestrial systems capable of providing electronic communications services that can coexist with GSM systems, in accordance with technical implementing

¹⁰ Please note that, in this study, we will refer where appropriate to the “Amended EU Regulatory Framework” or the “2009 EU Regulatory Framework” when citing the new set of texts published on 18 December 2009 that amend the 2002 EU Regulatory Framework.

¹¹ Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services (the “Amended Framework Directive”).

¹² Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users’ rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws (the “Consumer Rights Directive”).

¹³ Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Office.

¹⁴ Directive 2009/114/EC of the European Parliament and of the Council of 16 September 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community.

measures adopted pursuant to the decision on the harmonisation of the 900MHz and the 1800MHz frequency bands for terrestrial systems capable of providing pan-European communications services (“the harmonised UMTS Decision”)¹⁵ published on the same day. Member States are required to comply with the Amended GSM Directive by 9 May 2010.

The harmonised UMTS Decision lists in an annex the terrestrial systems capable of providing electronic communications services that can coexist with GSM systems in the 900MHz band. This decision also provides that the 1800MHz band shall be designated and made available for GSM systems by 9 November 2009 and for other terrestrial systems capable of providing electronic communications services listed in the annex of the decision by 9 May 2010.

*Commission
Recommendation
on the digital
dividend and
pending Radio
Spectrum
Committee 800MHz
Decision*

On 28 October 2009, the European Commission adopted a recommendation¹⁶ pursuant to which Member States should take all measures necessary to ensure that terrestrial television broadcasting services use digital transmission technology and cease using analogue transmission technology on their territory by 1 January 2012. Under this recommendation, Member States should support regulatory efforts towards harmonised conditions of use of the 790-862MHz sub-band for electronic communications services.

The Commission plans to adopt in 2010 a decision prepared by the Radio Spectrum Committee setting forth harmonised technical requirements for the future use of the 790-862MHz sub-band terrestrial systems capable of providing electronic communications services in the Community.

¹⁵ Commission Decision of 16 October 2009 on the harmonisation of the 900MHz and the 1800 MHz frequency bands for terrestrial systems capable of providing pan-European communications services in the Community (2009/766/EC).

¹⁶ Commission Recommendation of 28 October 2009 facilitating the release of the digital dividend in the European Union (2009/848/EC).

0.4 Structure of the document

Each topic of this report is covered as a separate section. Within each of these topics, we have included (where relevant):

- background and/or current situation
- market issues/failures
- European situation/benchmarks
- a recommendation section. Each of our recommendation section includes
 - a summary of the key recommendations (please note that this summary does not exhaustively list our recommendations but instead focuses on the most important and structuring ones)
 - all recommendations are then presented, structured by main area (e.g. spectrum packaging, award process and timing, prices).

We also present an overall conclusion, which examines the timing consistency of our main recommendations as well as their likely impact and anticipated difficulty of implementation.

1 Topic 1: Promotion of mobile broadband

In this section, we first look at the current situation of mobile broadband in Belgium compared to other European countries. We then identify the main issues that can explain the current situation in Belgium. Finally, we present our recommendations.

Note: Mobile broadband lines refer to PC or laptop 3G connections via a USB modem or datacard. It excludes handset access, the use of handset as modem and 2.5G connections.

1.1 Current situation

As illustrated in the figure below, mobile broadband had quickly developed in recent years in most of countries that comprised the EU prior to 2004 (EU15).

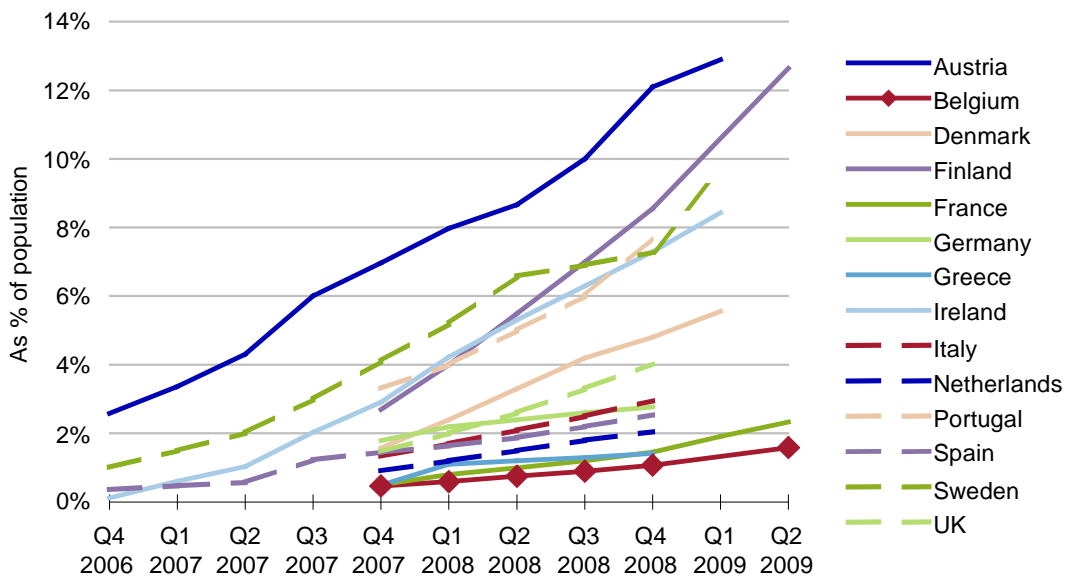


Figure 1.1: Mobile broadband subscriptions in EU15, excluding Luxembourg (2006–2009) [Source: Analysys Mason, regulators]

However, as illustrated in both Figure 1.1 and Figure 1.2, mobile broadband penetration in Belgium is relatively low compared to other European countries.

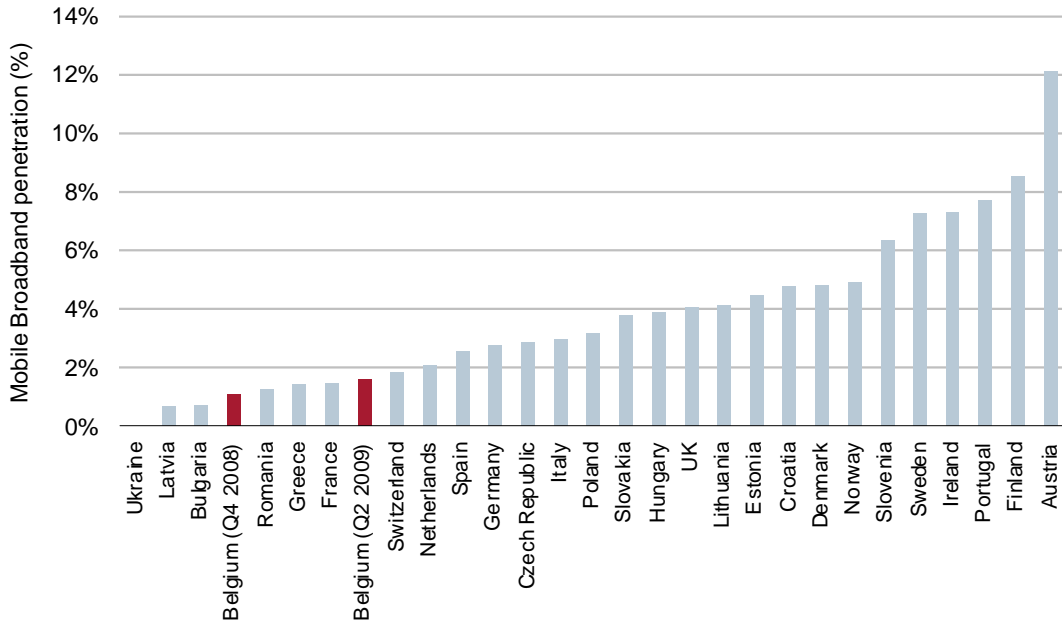


Figure 1.2: Comparison of Belgium mobile broadband penetration (Q4 2008 & Q2 2009) vs. other European countries (Q4 2008) [Source: Analysys Research, regulators, operators]

1.2 Main issues identified

We have identified several reasons that can explain the current low mobile-broadband penetration in Belgium:

- mobile broadband has had quite a late commercial launch in Belgium compared to other EU countries
- level of competition is relatively weak
- the tariff structure of the current market offers are complex
- tariff levels are relatively high in comparison to other countries
- terminal and services bundling is still prohibited in Belgium (even though, in practice, terminal and service bundling is now present on the market since the 23 April 2009 Court of Justice’s decision against the general prohibition of combined offers under Belgian law)¹⁷
- the current regulatory fee structure for spectrum does not encourage operators to launch aggressive mobile broadband offers, which require greater network capacity.

These are discussed further in the rest of this section.

¹⁷ The Belgium legal framework is currently under review following the 23 April 2009 judgement of the Court of Justice of the European Union holding that the general prohibition of combined offers provided by Belgian law is contrary to European law. More details are provided on this judgement under the sub-section “Terminal and services bundling is currently prohibited in Belgium” in Section 1.2 of this study.

Mobile broadband in Belgium has had a late commercial launch in comparison to other EU countries

As presented in the figure below, the commercial launch of mobile broadband in Belgium has been quite late in comparison to other EU countries.

| <i>Country</i> | <i>Date of launch</i> | <i>Operator</i> | <i>Market entry position</i> |
|----------------|-----------------------|-------------------------------|------------------------------|
| Germany | February 2004 | Vodafone & T-Mobile | First & second entrants |
| Italy | February 2004 | Vodafone | Second entrant |
| Spain | February 2004 | Vodafone | Second entrant |
| Sweden | February 2004 | Vodafone (Telenor) | Second entrant |
| Netherlands | February 2004 | Vodafone | Second entrant |
| UK | February 2004 | Vodafone & Orange | First & third entrants |
| Finland | May 2004 | Elisa | Second entrant |
| Austria | May 2004 | T-Mobile | First entrant |
| Ireland | June 2004 | Vodafone | First entrant |
| Belgium | June 2006 | Belgacom Mobile (Proximus) | First entrant |
| France | July 2007 | SFR | Second entrant |

Figure 1.3: Date of launch of mobile broadband in European countries [Source: Press articles, operators' websites]

The relationship between the number of months since commercial launch and broadband penetration is illustrated in Figure 1.4. We notice that in most of the European countries, the successful take up of mobile broadband has been achieved three to four years after commercial launch. Therefore, it is important to make sure that favourable conditions are in place in order to ensure that take up in Belgium can happen in the next couple of years.

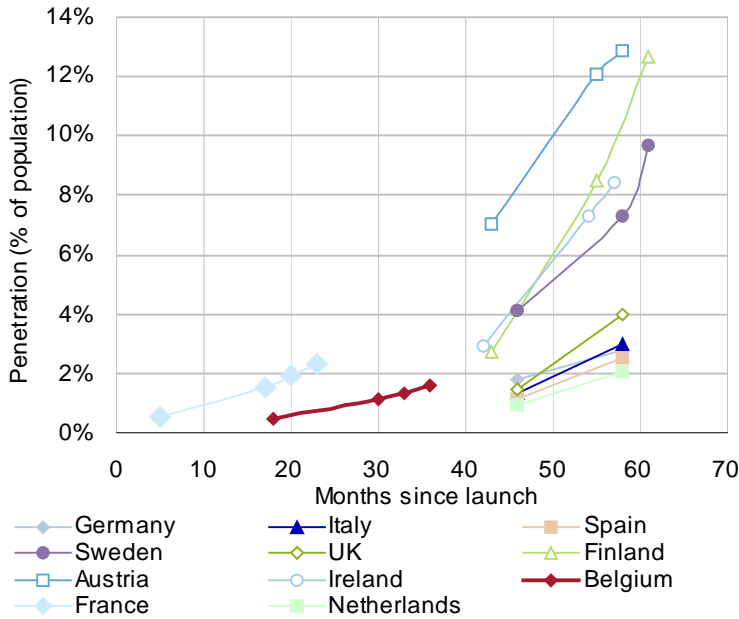


Figure 1.4: Benchmark of mobile broadband penetration against months since launch [Source: Analysys Mason, operators]

Level of competition is relatively weak

The level of competition between mobile broadband operators is relatively weak in Belgium. We believe this is mainly due to the following factors:

- Belgium is a three-player market. There is not (like in a few other European countries) a pure 3G operator that would typically try to be aggressive regarding mobile broadband offers (such as 3 in Austria, Denmark, Ireland, Italy, Norway, Sweden and the UK).
- Base, the third mobile entrant in the market, has not yet launched commercial 3G services, (however, earlier in 2009 it announced that it will launch 3G services by end of 2009.)¹⁸
- Belgacom Mobile (Proximus) has commercial agreements with Vodafone. Vodafone has tended to be quite aggressive in other European markets regarding its promotion of mobile broadband, but seems to be more ‘cautious’ in Belgium.
 - We believe this is mainly due to Belgacom Mobile’s position as the fixed incumbent operator. Therefore, Belgacom Mobile has no interest in cannibalising its own fixed broadband revenues (unless forced to do so by a competitor).
- There are no strong marketing campaigns promoting mobile broadband services from any of the operators.

¹⁸ E.g., 27 August 2009 and 22 December 2009 press releases of KPN Group Belgium/Base.

The tariff structure of the current market offers are complex

We present below the main mobile broadband offers currently available in the Belgian market.

| <i>Operator</i> | <i>Plan</i> | <i>Monthly fee</i> | <i>Extra fee per day of use</i> | <i>Volume transfer included</i> | <i>Per MB cost for excess volume</i> | <i>Data card / USB modem cost</i> |
|-----------------|--|--------------------|---------------------------------|---|---|-----------------------------------|
| Mobistar | Internet Everywhere | EUR5 | EUR1 | 1GB | EUR0.1 | EUR49 |
| Mobistar | Internet Everywhere Max | EUR30 | EUR0 | 2GB | EUR0.1 | EUR0 |
| Belgacom Mobile | Mobile Internet 15h | EUR12.49 | EUR0 | No volume limit but time limit of 15 hour | EUR2.49 per hour | EUR0 |
| Belgacom Mobile | Mobile Internet Anytime | EUR29.99 | EUR0 | 2GB | EUR0.03 | EUR0 |
| Belgacom Mobile | Mobile Internet Free Weekend ¹⁹ | EUR0 | EUR0 | Off-peak: 500MB Peak : None | Off-peak: EUR0.03/MB Peak : EUR2.49/hr | EUR0 |
| Belgacom Mobile | Mobile Internet Evening & Weekend | EUR10 | EUR0 | Off-peak: 500MB Peak : None | Off-peak: EUR0.03/MB Peak : EUR2.49/hr | EUR0 |

Figure 1.5: *Examples of mobile broadband offers in Belgium [Source: Operators’ websites, January 2010]*

The tariff structure of the current mobile broadband offers is complex. It is characterised by:

- a fixed monthly fee (allowing a limited volume of transfer or a limited amount of hours as per Belgacom Mobile’s Mobile Internet 15h offer)
- an additional price per megabyte (and sometimes a fee per hour, as per Belgacom Mobile’s Mobile Internet Evening & Weekend offer)
- daily fee (as per in the Mobistar Internet Everywhere offer).

In comparison, in several European countries, mobile broadband offers are less complex than in Belgium by providing, for example:

- unlimited offers
- no one-off fees (for example for hardware).

¹⁹ Belgacom Mobile Internet Free Weekend is only available to Belgacom’s fixed broadband subscribers

As an illustration, the figure below presents the structure of the cheapest mobile broadband offer in the main EU countries for a monthly usage of 2GB.

| <i>Country</i> | <i>Operator</i> | <i>Monthly fee (EUR)</i> | <i>Extra fee per day of use (EUR)</i> | <i>Volume transfer included (GB)</i> | <i>Per MB cost for excess volume (EUR)</i> | <i>Data card / USB modem cost (EUR)</i> |
|----------------|-----------------|--------------------------|---------------------------------------|--------------------------------------|--|---|
| Austria | 3 | 9.00 | 0 | 3 | 0.10 | 3 |
| Belgium | Belgacom Mobile | 29.99 | 0 | 2 | 0.03 | 0 |
| Finland | DNA | 9.80 | 0 | No | 0.00 | 0 |
| France | Bouygues | 29.99 | 0 | No | 0.00 | 29 |
| Germany | O2 | 21.25 | 0 | No | 0.00 | 0 |
| Ireland | O2 | 19.99 | 0 | 10 | Fair Usage Applies | 0 |
| Italy | 3 | 19.00 | 0 | 5 | 0.005 | 0 |
| Netherlands | KPN Mobile | 35.00 | 0 | No | 0.00 | 0 |
| Spain | Orange | 36.00 | 0 | 2 | 0.04 | 0 |
| Sweden | TeliaSonera | 10.54 | 0 | No | 0.00 | 0 |
| UK | 3 | 16.77 | 0 | 15 | 0.11 | 0 |

Figure 1.6: *Main characteristics of mobile broadband cheapest offers for a monthly usage of 2GB in main EU countries [Source: Analysys Mason, Operators' websites, May 2009]*

Tariff levels are relatively high in comparison to other countries

In addition, Belgian tariff levels are relatively high when compared to other countries. As presented in Figure 1.7, mobile broadband offerings in Belgium are at the high end of our benchmark, particularly for high consumptions (e.g. for volume over 2GB per month). It should be noted that tariff levels for low consumptions (e.g. for volume less than 2GB per month) have significantly decreased during the second semester of 2009. However, the high consumption offer that was proposed by Belgacom Mobile during the first semester of 2009 has been stopped. This has a considerable impact on prices for volume over 2GB per month as subscribers have only the choice to buy an offer for a volume of 2GB per month and pay additional cost for excess volume.

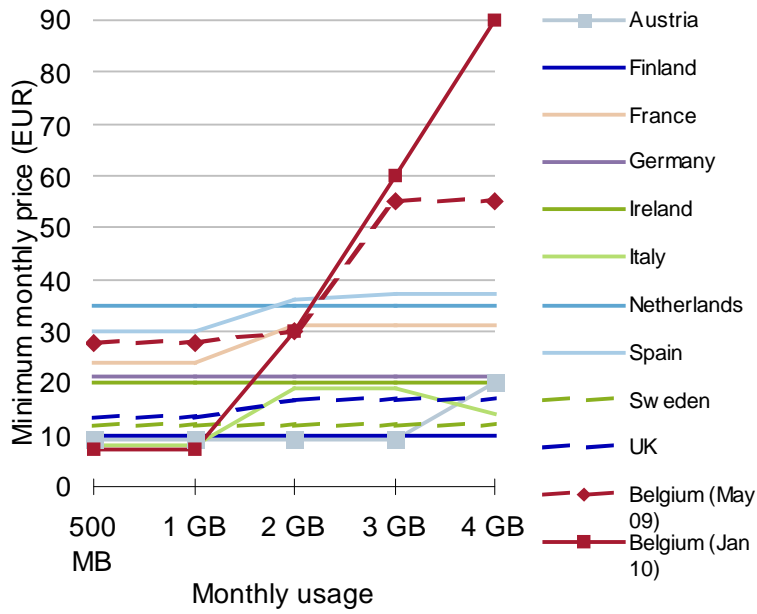


Figure 1.7: A comparison of cheapest mobile broadband offers in Belgium (May 2009 and January 2010) with other EU countries (May 2009)²⁰ [Source: Analysys Mason, Analysys Research, operators' websites]

As presented in Figure 1.8, there is a clear correlation between mobile broadband penetration and the monthly price of mobile broadband offers. As indicated by the extrapolation curve (dotted line), monthly prices below EUR20 seem to have a positive impact on penetration.

²⁰ For each monthly data usage, we compare the cheapest mobile broadband plan available in each country. The monthly cost includes the monthly subscription, any traffic billed, and the activation and hardware costs (we assume an average customer lifetime of 24 months). For operators charging an additional fee for days of use on top of the monthly fee, we assume that the average customer connects 20 days a month.

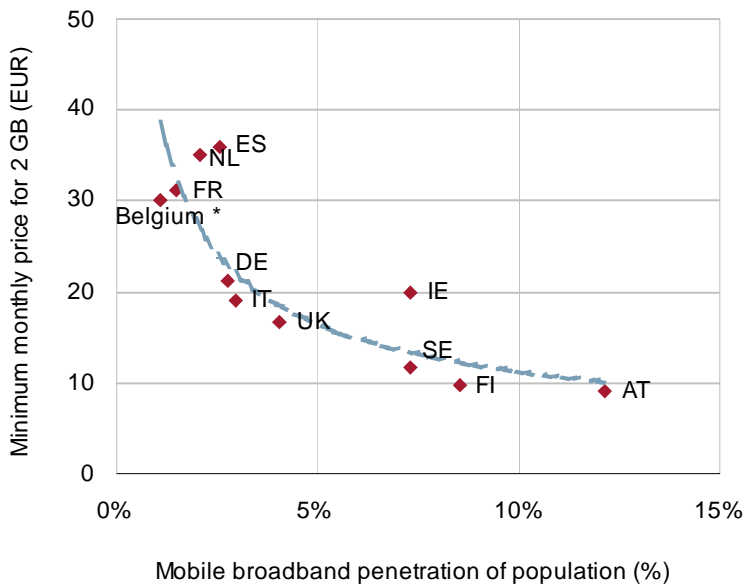


Figure 1.8: Mobile broadband price versus mobile broadband penetration [Source: Analysys Mason, operators' websites, May 2009] *Prices for Belgium are of May 2009 and January 2010 as cheapest offer for a 2GB is equivalent

Terminal and services bundling is still prohibited in Belgium

At present, there are two types of bundles offered:

- “service bundling”, which consists of grouping different services in one package (e.g. voice and broadband)
- “terminal and services bundling”, which consists of grouping together services and terminal (e.g. mobile offer and handset).

As in other European countries, service bundling is a common practice in Belgium.

Terminal and service bundling, however, is still prohibited in Belgium. Article 54 of the Law of 14 July 1991 on commercial practices, consumer information and consumer protection states that, subject to some exceptions, “any combined offer to consumers which is made by a vendor is prohibited”.

An exception to the prohibition of combined offers is provided in the telecommunications sector. Article 112 of the 2005 Telecommunications Law provides that, under certain conditions, combined offers of telecommunications services and/or intermediary interactive products constitute a “single unit” and are not considered to be prohibited combined offers. However according to the interpretation of this provision by the Vice-Prime Minister and Minister for Budget and Consumer Protection on the basis on the preparatory legislative work²¹ of the Law on electronic communications, terminals do not fall into the scope of this exception.²² Combined

²¹ Amendment n°147 of the proposed 2005 Law on electronic communications was concerned.

²² The Vice-Prime Minister and Minister for Budget et Consumer Protection provided such interpretation in his answer to the written question n°4-5 from Geert Lambert dated 15 October 2007 during the 2007–2008 session of the Belgian Senate relating to the i-phone combined offer, <http://www.senate.be/www/?MIval=/Vragen/SchriftelijkeVraag&LEG=4&NR=5&LANG=fr>

offers of telecommunications services and terminals are therefore prohibited in Belgium even though this is a common practice in other European countries.²³

It should however be noted that, this prohibition cannot be sustained in light of a recent court judgement. On 23 April 2009, the Court of Justice of the European Union found that the general prohibition of combined offers provided by Belgian law is contrary to European law. According to the Court of Justice, the EU “Unfair Commercial Practices Directive 2005/29/EC precludes “the system implemented by Article 54 of the 1991 Belgian law in so far as that article prohibits, generally and pre-emptively, combined offers without any verification of their unfairness in the light of the criteria laid down in Articles 5 to 9 of the Directive”²⁴. As a consequence of this judgement, combined offers can no longer be generally prohibited. Belgian authorities must therefore assess the unfairness of each combined offer in the light of criteria laid down in the 2005 Directive. In this context, it should be noted that “The Phone House” has launched in Q2 2009 a “terminal and mobile postpaid bundle”.

When assessing the impact of this judgment, it also should be noted that the Court of Justice judgment is based on consumer protection rules and does not address issues related to competition law. In addition, the disputes at the origin of the Court of Justice judgment did not concern combined offers in the telecommunications sector.²⁵ Thus, Belgian authorities cannot look to this judgment for specific limits or guidance in the electronic communications sector, but will instead need to develop a position for applying the criteria of the directive in the electronic communications context.

We believe this position is required, since the absence of bundled offers could slow down the development of the mobile broadband market in the future. Bundling of notebooks with a mobile broadband offer for example have eased mobile broadband take up in other countries such as Finland and Sweden.

We note that the Belgium legal framework is currently under review in order to comply with the 23 April 2009 judgement of the Court of Justice. We understand that the relevant law is being changed at the time of writing this report.

²³ Pedro Pita Barros, Universidade Nova de Lisboa, *Handset subsidies – An Empirical Investigation*, Seminarios ANACOM, November 22, 2006, http://www.anacom.pt/streaming/est22112006.pdf?categoryId=218502&contentId=424227&field=ATTACHED_FILE

²⁴ Joined cases C-261/07 and C-299/07, *VTB-VAB and Galatea*, Judgement of the Court of Justice of 23 April 2009, §62, interpreting Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market, OJ L/149, 11 June 2005, p.22.

²⁵ The questions referred to the Court of Justice were submitted in the course of two proceedings, one related to the offer by an oil company of free breakdown services for a period of three weeks to consumers with every purchase of fuel, and another concerning a voucher contained in a magazine for a reduction of 15% to 25% on products sold in a number of lingerie shops.

The current regulatory fee structure for spectrum does not encourage operators to launch aggressive mobile broadband offers which require more capacity on operators' networks

European experience clearly indicates that mobile broadband take up drives a strong traffic increase on mobile network. Cisco forecast mobile data traffic growth in Western Europe at 131% CAGR until 2013. Such forecasts may be brave, but average subscriber mobile traffic is likely to reach similar levels to that of current fixed broadband traffic in the coming years.

In Sweden, average data usage prior to a full HSPA upgrade was 457MB per user, per month. Current usage increased fourfold, with nearly 2GB per user, per month (e.g. on average 24% by quarter (as shown in Figure 1.9).

Similarly, in Norway, the average traffic per user increased in average by 16% per quarter between Q4 2007 and Q2 2009 (as shown in Figure 1.9, below).

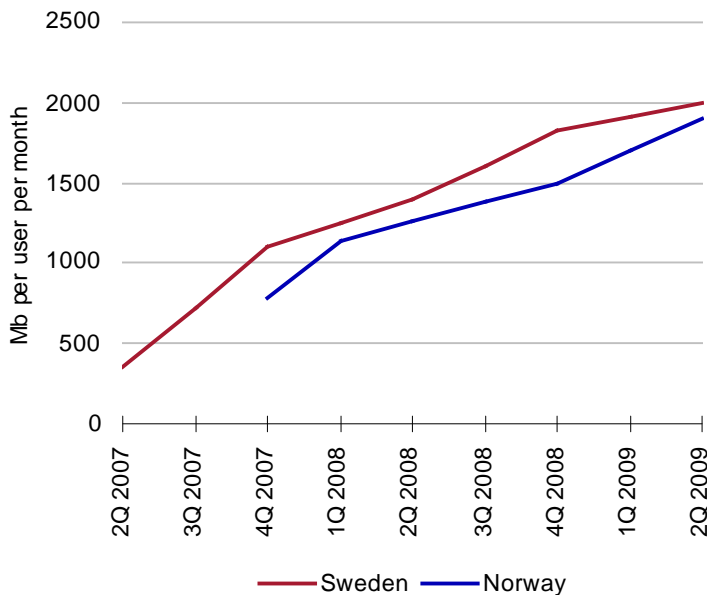


Figure 1.9: Data usage per subscriber dongle in Sweden and Norway [Source: PTS, NPT]

UK mobile operators have also reported rapid increases in data traffic volumes carried on their networks. Over the period October 2007 to April 2008, the mobile operator 3 reported a ten-fold increase in traffic carried on its network. This growth was attributed to the take-up of USB dongles for mobile broadband.

The increase of data traffic will have an important impact on operators' backhaul network. In recent business plans developed in the context of other studies, we have evaluated that the backhaul cost as a proportion of total network opex and capex increases from around 10% to 30% with the introduction of mobile broadband. As mobile operators generally tend to rely on microwave links for their backhaul networks, this implies that microwaves link prices become particularly important with the development of mobile broadband services.

3G spectrum annual fees depend on carrier use²⁶ and are based on EUR125 000 per MHz duplex for FDD mode, which is equivalent to EUR625 000 per carrier (5MHz duplex). The use of 3 carriers (which is equivalent to EUR1.875 million) instead of 1 carrier would represent an increase of network opex and capex by less than 2%.

The current structure of microwave and spectrum fees might disincentive Belgian operators from introducing aggressive mobile broadband offers in the market:

- microwave fees, typically used for backhaul links, are high in comparison to other European countries (see Topic 9 for further detail). and is likely to slow down the development of mobile broadband services
- even through the impact of spectrum fees may be limited in absolute values, its price structure, which depend on carrier use does not encourage operator to launch mobile broadband offers (which requires significantly more spectrum than voice and basic data services).

1.3 Recommendations

In this section we first present a summary of our main recommendations and we then describe these recommendations.

1.3.1 Summary

Our main recommendations can be summarised as follows:

- Promote and encourage entry of new mobile players (T1-1)
- Include mobile broadband offers in the BIPT comparison tool (T1-2)
- Allow terminal subsidy and bundling (T1-3)
- Reduce tariffs for microwave links (T1-4).

These recommendations are detailed in the following sections.

1.3.2 Description of recommendations

We have identified the key success factors that made mobile broadband successful in other European countries and classified these key success factors under four categories:

- market competitiveness
- network infrastructure
- pricing
- services and offer characteristics

These key success factors are presented below:

²⁶ Annual spectrum fees also include administrative charges linked to the management of frequencies as provided under Section XVI of the 18 January 2001 Royal Decree concerning 3G authorisations as amended.

| | |
|---|--|
| <i>Market competitiveness</i> | <ul style="list-style-type: none"> • competitive positioning compared to DSL • existence of a pure 3G operator in the market that can act as a catalyst • not too competitive fixed broadband market • high penetration of laptops/notebooks • fixed-mobile substitution (for example, in Austria, mobile has become a substitute for fixed line) |
| <i>Network infrastructure</i> | <ul style="list-style-type: none"> • good mobile network quality mainly related to speed and coverage • poor fixed infrastructure and quality of DSL (for example mobile broadband has been a substitute of Fixed Broadband in some Eastern European countries) • favourable population density and geography |
| <i>Pricing</i> | <ul style="list-style-type: none"> • low price premium between mobile broadband and DSL • high fixed-broadband prices • entry-level prices for mobile broadband offers cheaper than the fixed equivalent • cheap devices in the form of USB dongles and notebooks • bundle of notebooks and dongles (or embedded modem) |
| <i>Services and offer characteristics</i> | <ul style="list-style-type: none"> • ease of use and configuration (i.e. plug and play) • short activation time compared to fixed broadband • convenience (it can be used everywhere) • existence of a range of simple offers adapted to different customer profiles (e.g. low usage and unlimited offers) • capacity capped and low speed of fixed broadband offers. |

As presented in the Figure 1.10, our recommendations to promote mobile broadband are linked to these key success factors.

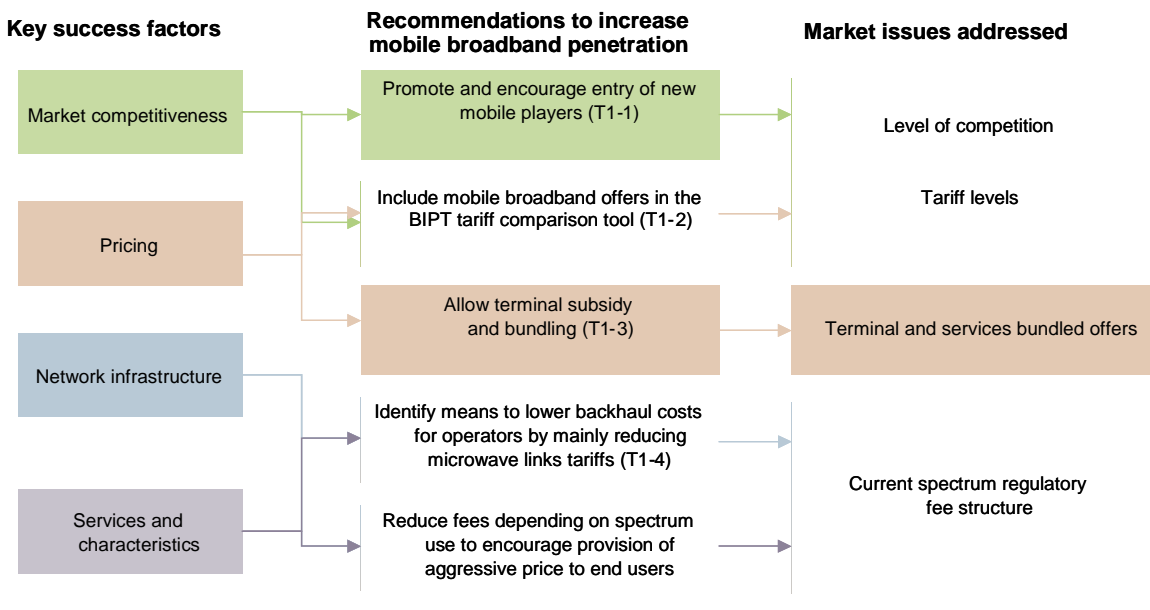


Figure 1.10: Recommendations proposed for increasing mobile broadband penetration [Source: Analysys Mason]

Promote and encourage entry of new mobile players

As previously mentioned, the competitive intensity of the mobile broadband market is relatively low. Promoting the entry of a new operator would increase the market competitiveness, as this player is likely to launch aggressive mobile broadband plans to rapidly acquire market share. In addition, the entry of a new player in the market should also have an impact on voice prices. It should be noted that the business case for a new mobile operator appears to be very difficult (see Topic 6) and as a result, we would recommend to put in place the most favourable regulatory, technical, and operational conditions to encourage market entry.

Include mobile broadband offers in the BIPT tariff comparison tool

BIPT is currently developing a tariff comparison tool, in order to provide consumers with a better understanding of main telecoms tariff offers and inform them about the most appropriate offer adapted to their needs. Including mobile broadband offers in this tool would provide consumers more visibility about the current market offers and would ease offer comparison.

Allow terminal subsidy and bundling

Allowing terminal subsidy and bundling would ease mobile broadband take-up in Belgium. We therefore recommend that, when bringing the current bundling prohibition into compliance with EU law as a consequence of the recent judgement of the Court of Justice, Belgium authorities consider what specific standards should apply to bundling of mobile terminals / handsets with services.

Considerations will include the duration of consumer contracts, balancing the need of the operators to recover the cost of subsidies versus the need to avoid excessive consumer lock-in that would adversely affect competition.

Recommendations issued at the European level regarding SIM-lock feature and terminal subsidies give some limited guidance on how to protect competition in this context.

On 30 May 1996, the European Commission wrote a letter to 2G handset manufacturers and network operators notifying them that it considered the SIM lock feature as having anti-competitive effects.²⁷ The European Commission set out conditions under which SIM-lock could be allowed. These include full disclosure to consumers that they could unlock the handsets. In circumstances where the sale of the handset is combined with the provision of a telephony service, and the sale of the handset has been subsidised by the network operator/service provider, the amount of the subsidy and specific commercial terms for recovering that subsidy has to be disclosed. Providers also must disclose any effect that the subsidy might have on the subscriber's ability to unlock the feature. The European Commission permitted service providers to keep the handsets locked until such time as the subsidy had been recovered.

²⁷ See IP/96/791, <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/96/791&format=HTML&aged=1&language=EN&guiLanguage=en>

Since then, the matter has been dealt with on a national level and there is no European legislation presently in force that deals specifically with SIM-lock practices. However, in the Amended Universal Service Directive²⁸, new provisions²⁹ could affect this matter. The amended directive states in a recital that “with respect to terminal equipment, the customer contract should specify any restrictions imposed by the provider on the use of the equipment, such as by way of "SIM-locking" mobile devices, if such restrictions are not prohibited under national legislation, and any charges due on termination of the contract, whether before or on the agreed expiry date, including any cost imposed in order to retain the equipment”.³⁰

There is no objective guidance at European level on how long subsidy lock-ins can be maintained, other than the duration should be sufficient to recover the subsidy. Any previous work on 2G SIM-lock duration may not apply completely to new 3G or other mobile broadband terminals. Consequently, we would recommend BIPT to conduct a specific consultation on this issue.

Identify means to lower backhaul costs for operators by mainly reducing microwave links tariffs

As previously discussed, mobile broadband can significantly increase the contribution of backhaul costs to the total network costs. Microwave links are traditionally one of the main means used by mobile operators for backhaul. In Belgium, tariffs for microwave links are extremely high in comparison to other European countries (see Topic 9). Microwave links tariffs mainly impact pure mobile operators and late entrants (e.g. Mobistar and Base) as these operators do not have a national fixed infrastructure. These prices therefore do not encourage operators to launch aggressive mobile broadband offers that will increase their backhaul capacity. We would recommend that the Belgian authorities reduce microwave link tariffs, as presented in Topic 9.

Reduce fees for spectrum use to encourage provision of aggressive pricing to end users

Annual 3G spectrum fees in Belgium are based on carrier usage.³¹ Belgacom Mobile, Mobistar and Base have all acquired 3 UMTS carriers but are currently only using one or two carriers. As previously discussed, 3G data traffic would trigger a significant increase in traffic. Reducing annual spectrum fees depending on spectrum usage could therefore encourage operators to provide aggressive prices to end users, as operators would not be “strongly financially penalised” to use additional spectrum. However, we would like to note that the impact of annual 3G spectrum fees is less important than backhaul prices discussed above, as the annual fee per MHz is EUR125 000, which is equivalent to EUR625 000 per carrier.

²⁸ Amended by the Consumer Rights Directive 2009/136/EC.

²⁹ Recital 24 of the Consumer Rights Directive and Article 20 (1) (b) of the Amended Universal Directive.

³⁰ Recital 24 of the Consumer Rights Directive.

³¹ Annual spectrum fees include usage rights as well as administrative charges linked to the management of frequencies as provided under Section XVI of the 18 January 2001 Royal Decree concerning 3G authorisations as amended.

2 Topic 2: Flexibility in mobile authorisations

In this section, we first explain the objectives and the key issues surrounding increased flexibility of mobile authorisations. We then describe such issues within a European context and finally, we present our main recommendations.

2.1 Objectives and key issues

Greater flexibility of mobile authorisations would allow the operator that holds rights of use to decide how the spectrum is used in terms of technology or/and service. Greater flexibility could also include allowing the operator to sell its spectrum directly to another organisation.

2.1.1 Objectives

Increasing the flexibility of mobile authorisations should benefit the entire sector, and in any event, will be required by pending changes to EU law. The main objectives of increasing the flexibility of authorisations include:

- efficient use of the awarded spectrum
- increased market fluidity (for example the ability to provide different services and/or different technologies with a single authorisation)
- end-user benefit (as increased efficiency of spectrum and market fluidity should drive price down and facilitate innovation on the market)
- reduced administrative burden for BIPT.

2.1.2 Key issues

Existing versus new authorisations

BIPT needs to distinguish between two cases when increasing the flexibility of mobile authorisations:

- **New authorisations:** In this case, BIPT should make authorisations as flexible as possible, taking into account the requirement to avoid discrimination against new operators compared to similarly situated existing operators (or vice versa).
- **Existing authorisations:** In this case, BIPT needs to change these authorisations in order to make them more flexible, but will have to observe legal constraints that apply to authorisations already in place.

Introducing flexibility requires taking into account changes to existing authorisations as well as conditions for new authorisations, both of which raise legal implications. When setting new authorisations, national regulatory authorities (NRAs) must avoid imposing discriminatory

authorisation conditions on existing authorisations by imposing more (or less) rigorous conditions. It is also likely that operators with existing authorisations will raise legal challenges to changes in those authorisations.

Applying different conditions to new authorisations could be challenged on the basis of the non-discrimination principle provided under EU law to the extent those conditions differ from existing conditions applicable to similarly situated operators. Non-discrimination is a key principle to the licensing scheme established by the EU Regulatory Framework.³² Nevertheless, not all procedures or authorisation conditions that differ amongst applicants and operators are necessarily discriminatory. The Court of Justice has held that discrimination can arise only through the application of different rules to comparable situations or the application of the same rule to different situations.³³ Nevertheless, the Court also has held that restrictions to the principle of non-discrimination could be accepted if such restrictions “respect the principle of proportionality, that is to say that they must be necessary and appropriate to attain the objective pursued”.³⁴ In the 20 July 2009 Decision, the Brussels Court of Appeal also confirmed that the “principle of equality and non-discrimination does not prevent the different treatment of operators in objectively different situations”.³⁵

In light of this standard, Belgian authorities would likely have substantial room to make new authorisations as flexible as possible.

Existing authorisations may contain ‘non-flexible’ conditions that require review under current and new EU legal provisions. Waiting for existing authorisations to expire could result in the delay of granting new authorisation, thus delaying the market entry of potential new entrants.

It may be possible to review existing authorisations in order to include new flexibility conditions on the basis of EU law, especially under the new legal standards adopted in 2009 that could give the BIPT fresh reasons for such a review. We discuss the background of the legal standards that may permit such a review in our recommendations.

Spectrum refarming

Spectrum refarming in the 900MHz band is one of the main drivers for introducing authorisations flexibility in Europe. In many countries, the usage of the 900MHz band is restricted to GSM technology, and regulatory approval is needed in order to use the spectrum for UMTS. Any such

³² E.g. Articles 5.2, §2 and 6 of the Authorisation Directive require non-discriminatory assignment procedures and conditions for rights of use.

³³ Case C-431/07, *Bouygues v Commission*, Judgment of the Court of Justice of 2 April 2009, at paragraph 114, citing Cases C 279/93, *Schumacker* at § 30, C 341/05, *Laval un Partneri* at § 115.

³⁴ Joined cases C-259/91, C-331/91 and C-332/91, *Pilar Allué and Carmel Mary Coonan and others v Università degli studi di Venezia and Università degli studi di Parma*, Judgment of the Court of Justice of 2 August 1993. -; Case C-15/96, *Kalliope Schöning-Kougebetopoulou v Freie und Hansestadt Hamburg*, Judgment of the Court of 15 January 1998.

³⁵ Brussels Court of Appeal Decision R.G. N° 2008/AR/3162, § 14. p.9

approval will involve some degree of spectrum refarming, as different technology is used in the same band.

Several NRAs have introduced refarming legislation in anticipation of a technology-neutral approach that was ratified at the European level. However, progress towards formalising this approach has been slow and the extent of reorganisation of the 900MHz band that is needed varies from market to market.

Several factors are influencing the speed at which regulators are clarifying regulation for the future usage of the 900/1800MHz bands including:

- how soon current GSM authorisations are due to expire, and the need that arises to clarify the future usage of these frequencies
- the need to implement any supranational regulatory decisions, such as those arising from the EC
- the current distribution and utilisation of the band
- the extent of demand from operators for in-band migration to UMTS, which, in turn, reflects the characteristics of their particular market, including the level of demand for 3G services and the operators' commercial strategies.

In many markets, preparatory measures are needed before refarming can take place. These may include:

- reorganising the band into 5MHz blocks of paired spectrum so that all the operators can deploy UMTS in 5MHz carriers
- restructuring the band to provide operators with contiguous blocks, so that they can make optimal use of their spectrum
- rebalancing operators' spectrum holdings between the 900MHz and 1800MHz frequencies if, for historical reasons, these have been assigned asymmetrically, (for example, with some operators holding spectrum predominantly at 900MHz and others mainly at 1800MHz, as it was the case in Austria, Belgium, Italy and the UK)
- setting aside a small amount of spectrum for auction to UMTS-only operators and/or a potential new entrant

The figure below presents the situation in different European countries. More detailed information is presented in Annex A.

| <i>European countries</i> | <i>Current plans for 900MHz band</i> |
|---------------------------|--|
| Austria | Consultations launched on the subject |
| Belgium | UMTS 900 authorised by NRA |
| Estonia | UMTS 900 authorised by NRA |
| Finland | UMTS 900 authorised by NRA |
| France | UMTS 900 authorised by NRA |
| Germany | Review of current authorisations in progress |
| Iceland | UMTS 900 authorised by NRA |
| Ireland | Consultations launched on the subject |
| Italy | Review of current authorisations in progress |
| Norway | Review of current authorisations in progress |
| Netherlands | Review of current authorisations in progress |
| Portugal | Review of current authorisations in progress |
| Romania | Consultations launched on the subject |
| Spain | Review of current authorisations in progress |
| Sweden | UMTS 900 authorised by NRA |
| Switzerland | Review of current authorisations in progress |
| UK | Review of current authorisations in progress |

Figure 2.1: Current plans for 900MHz band in European countries [Source: Analysys Mason, NRAs, 2009]

Coverage obligations

Coverage obligations can also be considered in context of building in more flexibility within authorisations:

- **High-frequency bands** generally have low coverage obligations, since these bands are not the most appropriate medium for roll out purposes. In this context, the question should be raised as to whether or not coverage obligations should be maintained in the future for high-frequency band authorisations.
- **Low-frequency bands** generally have stricter coverage obligations (than higher frequency bands). However, in most cases, players have exceeded the coverage obligations of their current authorisations (e.g. GSM authorisation obligations), therefore demonstrating their economic interests to have a wide network coverage. In this context, the question should be raised as to whether or not coverage obligations should be maintained in the future for low-frequency band authorisations.

2.2 European context

Technology neutrality and service neutrality

► *EU spectrum policy*

Efforts to apply neutrality concepts to the mobile sector commenced as early as 2005, when the Radio Spectrum Policy Group (RSPG) issued an opinion that technology neutrality and service neutrality are policy goals that should achieve a more flexible use of spectrum.³⁶ Subsequently, the Commission issued a communication on “Rapid access to spectrum for wireless electronic communications services through more flexibility”³⁷, stressing the need for a consistent and proportionate solution regarding the second- and third-generation mobile bands.

On 20 October 2009, the Directive amending the GSM Directive (“the Amended GSM Directive”) was published in the EU Official Journal.³⁸ Under this Directive, Member States shall make the 900MHz frequency band available for GSM and UMTS systems, as well as for other terrestrial systems capable of providing electronic communications services that can coexist with GSM systems, in accordance with technical implementing measures adopted pursuant to the Decision on the harmonisation of the 900MHz and the 1800MHz frequency bands for terrestrial systems capable of providing pan-European communications services (“the harmonised UMTS Decision”) published on the same day.³⁹ Member States must comply with the Amended GSM Directive by 9 May 2010.

The harmonised UMTS Decision lists the terrestrial systems capable of providing electronic communications services that can coexist with GSM systems in the 900MHz band. This decision also provides that the 1800MHz band shall be designated and made available for GSM systems by 9 November 2009 and for other terrestrial systems capable of providing electronic communications services listed in the annex of the decision by 9 May 2010.

The Amended GSM Directive drives the adoption of technology and service neutrality throughout the Community by allowing systems capable of providing electronic services not limited to GSM to use the bands covered by the GSM Directive, subject to some limits:

³⁶ RSPG Opinion #3 on Wireless Access Policy for Electronic Communications Services (WAPECS) (A more flexible spectrum management approach), RSPG05-102 final, 23 November 2005.

³⁷ Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the regions, COM(2007) ,50 final, 8 February 2007.

³⁸ Directive 2009/114/EC of the European Parliament and of the Council of 16 September 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community.

³⁹ Commission Decision of 16 October 2009 on the harmonisation of the 900MHz and the 1800 MHz frequency bands for terrestrial systems capable of providing pan-European communications services in the Community (2009/766/EC).

- The Directive stresses that the current use of GSM in those bands should remain protected as long as there is a reasonable demand for the service.⁴⁰
- When implementing the Directive, Member States are called upon to examine whether the existing assignment of 900MHz spectrum is likely to distort competition in the mobile markets. They should consider whether in order to address such distortions it would be objectively justified and proportionate to amend the rights of use of those operators that were granted rights of use of 900MHz frequencies.⁴¹

The CEPT (Conference of European Postal and Telecommunications Administrations) has studied UMTS FDD and GSM compatibility and concluded that they can co-exist by using appropriate values for carrier separation (guard bands). Nevertheless, there remain some technical questions on how to implement additional use of the 900MHz band. At present, there are not as yet harmonised ‘technology neutral’ technical conditions agreed within CEPT or by the European Commission for use of the 900MHz frequencies:

- The 900MHz band is discussed within the CEPT Report 19 on WAPECS⁴², but no harmonised, technology-neutral, block edge masks are defined.
- Conclusions have not yet been reached on whether UMTS TDD or other TDD technologies (e.g. WIMAX) could co-exist.

On 28 May 2009, the Radio Spectrum Policy Committee issued a mandate to the CEPT to study the technical implications of the introduction of new technologies in these bands in order to ensure coexistence with GSM, as well as flexible spectrum use and notably, the technical conditions under which LTE technology can be deployed in the 900/1800MHz bands. The final report is expected to be delivered by Q3 2010.⁴³

Alternative approaches to defining technical conditions for access to spectrum are defined in CEPT Report 19. This report focussed on bands of particular interest for use by mobile and

⁴⁰ Recital 4 of the Amended GSM Directive.

⁴¹ Recital 7 and Article 2 of the Amended GSM Directive.

⁴² Report 019 from CEPT to the European Commission in response to the Mandate to develop least restrictive technological conditions for frequency bands addressed in the context of WAPECS, 21 December 2007.

⁴³ European Commission, Radio Spectrum Policy, Mandate to CEPT on the 900/1800MHz bands, 28 May 2009, DG INFSO/B4.

wireless broadband services, in the context of the EC’s WAPECS initiative.⁴⁴ Figure 2.2 summarises the approaches considered.

| <i>Approach</i> | <i>Advantage</i> | <i>Disadvantage</i> |
|---|---|---|
| Traditional method based on sharing and compatibility analysis | Takes account of actual equipment transmit and receive performance e.g. adjacent channel leakage radio | Depends on specifying technical conditions based on specific equipment standards and, as such, limits the technology that can be used |
| Definition of block edge masks (BEM), either transmit power BEM or equivalent isotropically radiated power (EIPR) BEM | No decision on technical or service to be offered needs to be taken by the regulator before the licence is awarded | In practice if definition of BEM involves more stringent emission limits than the equipment standard, this increases deployment costs due to additional filtering being needed to conform with the mask |
| Power flux density mask (PFD) | Regulates aggregate level received power on the interfered network from the interfering network, without reference to individual transmitters, and so is in theory ‘neutral’ of technology used | Significantly more complex to define due to the many performance assumptions needed, and to measure, in order to pinpoint interference |
| Power spectral density (PSD) mask | Defining aggregate power spectral density in a given area, rather than PFD (Method 3) removes ambiguity to do with needing to understand receiver characteristics in detail | Complex to implement, and separate masks needed for base station and mobile stations, and for TDD and FDD |

Figure 2.2: Approaches for technology neutral conditions [Source: CEPT Report 19, Analysys Mason]

► *EU Regulatory Framework*

Article 8 of the 2002 EU Framework Directive⁴⁵ already requires NRAs to take utmost account of desirability of making regulations technologically neutral.

The 2009 Amended EU Regulatory Framework for electronic communications⁴⁶ confirms and extends the EU’s shift towards technology and service neutrality, flexibility in management and access to spectrum:

- The implementation of technology and service-neutral authorisations is required.⁴⁷

⁴⁴ Wireless Access Policy for Electronic Communication Services represents EC policy to allow more flexible use of spectrum for wireless broadband, mobile and other electronic communications services, with fewer restrictions on technical conditions of spectrum use. The WAPECS principles are to be used with a set of frequency bands as agreed between the EC and Member States. Within those bands, services may be offered on a technology and service neutral basis provided that requirements to avoid interference are met. Those requirements are defined in the form of ‘Block Edge Masks’ developed by CEPT. WAPECS has initially focussed on the 2.6 GHz band, with other bands considered including 3.4 GHz and refarmed 2G spectrum.

⁴⁵ Framework Directive 2002/21/EC.

⁴⁶ Amended in Directive 2009/140/EC.

⁴⁷ Recital 34, and Article 9.3 and 9.4 of the Amended Framework Directive. This recital is to Directive 2009/140/EC that amends the Framework, Access and Authorisation Directives. We jointly reference the recitals as Amended Framework Recitals.

- In the interest of flexibility and efficiency, NRAs may allow spectrum users to freely transfer or lease their usage rights to third parties.⁴⁸
- The introduction of technology and service neutrality may require transition rules, including measures to ensure fair competition, as the new system may entitle certain spectrum users to start competing with spectrum users having acquired their rights under more burdensome terms and conditions.⁴⁹
- Where rights of use contain renewal provision, NRAs should carry out a review in which they balance the interests of the rights holders with the need to foster the introduction of spectrum trading as well as more flexible use of the spectrum through general authorisations where possible.⁵⁰

Spectrum trading

► *2002 EU Regulatory Framework*

Spectrum trading is possible and encouraged under EU law. Under the 2002 EU Regulatory Framework, Article 9 of the Framework Directive provides that “Member States may make provision for undertakings to transfer rights to use radio frequencies with other undertakings” under certain conditions:

- Member States shall ensure that the NRA responsible for spectrum assignment is notified of any undertaking’s intention to transfer rights to use radio frequencies, and that any transfer shall take place in accordance with the procedures laid down by the NRAs and shall be made public.
- NRAs shall ensure that competition is not distorted as a result of any such transaction.
- Where radio frequency use has been harmonised, spectrum trading shall not result in change of use of that radio frequency.

► *2009 EU Regulatory Framework*

New Article 9b of the Amended Framework Directive introduces further possibilities to lease individual rights to use radio frequencies to other undertakings. Rather than encourage trading, the amendments require Member States to ensure that undertakings may transfer or lease right of use in bands which have been identified under Commission technical implementing measures.

In particular, conditions for spectrum trading are lightened. Member States would only be required to “ensure that an undertaking’s intention to transfer rights to use radio frequencies, as well as effective transfer thereof is notified in accordance with national procedures to the competent national authority responsible for granting individual rights of use and is made public”.

⁴⁸ Recital 39 and Article 9b of the Amended Framework Directive.

⁴⁹ Recital 40 of the Amended Framework Directive.

⁵⁰ Recital 69 of the Amended Framework Directive.

The Amended EU Regulatory Framework highlights the fact that, “in the view of their power to ensure effective use of spectrum, NRAs should take action so as to ensure that trading does not lead to a distortion of competition where spectrum is left unused”⁵¹. It also provides that “the introduction of trading for existing spectrum usage rights may require transitional rules, including measures to ensure fair competition”.⁵²

2.3 Recommendations

This section is structured as follows:

- summary of our main recommendations
- general principles
- recommendations to introduce more flexibility
- recommendations related to coverage obligations
- recommendations related to spectrum trading.

2.3.1 Summary

Our main recommendations can be summarised as follows:

- consider amending the legal framework (T2-1)
- introduce more flexibility into current authorisations (T2-2)
- introduce more flexibility into new authorisations (T2-3)
- introduce spectrum trading and review the current Belgian legal framework in order to include notification to BIPT when spectrum is traded in high frequency bands (T2-4).

These recommendations are detailed in the following sections.

2.3.2 General principles

As an overview to these objectives, we suggest that Belgian authorities follow European best practice regarding flexibility in mobile authorisation, but do not necessarily take the lead on these issues. Some of the requirements arise from new EU law requirements and, in general, the move towards flexibility is relatively new. The approach of following best practice, rather than seeking to be the first to adopt such approaches, would allow Belgian authorities to benefit from relevant experience in other Member States and make appropriate regulatory choices based on market and player feedback.

⁵¹ Recital 39 and Article 9.7 of the Amended Framework Directive.

⁵² Recital 40 of the Amended Framework Directive.

2.3.3 Recommendations to introduce technological neutrality in current and new authorisations

We recommend that technological neutrality be determined on a case-by-case basis. This could be achieved through the implementation of several amendments to the legal framework, current and new authorisations, as described below.

Consider amending the legal framework

- ▶ *Consider what changes will be needed to amend the legal framework applicable to 2G authorisations*

Belgium will ultimately be required to amend the Royal Decrees dated 7 March 1995 and 24 October 1997, related to GSM networks and DCS-1800 networks, in order to remove any remaining technological restrictions. While this is a matter for the Belgian government rather than BIPT, it is a recommendation for BIPT to bring forward to the government. We do not recommend making those changes yet, but instead for BIPT to review best practice amongst EU Member States.

These Decrees remain technology focused and include several limits to technology neutrality.⁵³ As an example, article 2§1 of the 1995 Royal Decree states that the “authorisation granted on the basis of this cahier des charges covers the deployment and exploitation in Belgium of a GSM mobile network using the European norm GSM in the 900MHz band”. Article 2§1 of the 1997 Royal Decree specifies that the authorisation granted on the basis of this cahier des charges covers the deployment and exploitation in Belgium of a GSM mobile network using the European norm DCS-1800 in the 1800MHz band.

- ▶ *Consider what changes will be needed to amend the legal framework applicable to 3G authorisations*

We recommend that BIPT also commence considering now what will be required to modify the 18 January 2001 Royal Decree related to 3G authorisations, as amended by the 28 March 2007 Royal Decree, and the 26 March 2009 BIPT Decision, to remove any technological restriction remaining in both legal instruments.

From 1 July 2008, 3G operators holding GSM authorisations in Belgium have been able to implement 3G networks in the 900MHz bands based on the Royal Decree dated 18 January 2001, as modified by the Royal Decree dated 28 March 2007 regarding 3G authorisations. The Decision of the BIPT Council, dated 26 March 2009 on the introduction of UMTS in the 880–915MHz and

⁵³

As developed in the sub-section “*Consider what changes will be needed to amend the legal framework applicable to 3G authorisations*”, we note that, since the entry into force on 1 July 2008 of the 28 March 2007 Royal Decree amending the 18 January 2001 Royal Decree related to 3G authorisations, 3G operators holding a 2G authorisation are allowed to use frequencies assigned to them in the 900 MHz bands to deploy their 3G network. The draft Royal Decree submitted to public consultation on 24 December 2009 introduces the same possibility concerning the 1800 MHz bands. However, this draft Royal Decree has not been adopted yet.

925–960MHz bands, specifies channel distribution between operators and applicable technical norms.

However, this regulatory structure retains technical restrictions which should be modified, consistent with the requirement to ensure that only systems that can coexist with existing services can be authorised. The [SM1]2007 Royal Decree and the 2009 BIPT Decision limit the possibility to deploy 3G networks to the 900MHz bands. Under the existing Belgian Framework, the 1800MHz bands therefore remain limited to GSM technology.

We note that the draft Royal Decree, amending the 7 March 1995 Royal Decree related to GSM networks, the 24 October 1997 Royal Decree related to DCS 1800 networks, the 18 January 2001 Royal Decree related to UMTS networks and the draft Royal Decree related to wireless access to the 2500-2690MHz frequency band and submitted to public consultation on 24 December 2009, provides for the possibility to deploy 3G networks in the 1800 MHz bands.⁵⁴ However, this draft Royal Decree has not been adopted yet.

Introduce more flexibility into current authorisation

The most legally robust way to introduce greater flexibility into current authorisations would be to wait for the expiry of existing authorisations and grant new authorisations with equivalent flexibility conditions.

However, on 20 July⁵⁵ and 22 September 2009,⁵⁶ the Brussels Court of Appeal quashed the 25 November 2008 BIPT Decision,⁵⁷ with respect to the tacit renewal of the authorisations of Belgacom Mobile and Mobistar. As a result of these Court decisions, Belgacom Mobile's authorisation is therefore tacitly renewed until 8 April 2015 and Mobistar's authorisation is tacitly renewed until 27 November 2015.

On 24 December 2009, BIPT adopted a decision⁵⁸ withdrawing its 25 November 2008 Decision that opposed the tacit renewal of Base's 2G authorisation.

The Brussels Court of Appeal confirmed in its 20 July 2009 decision that “each authorisation has its own specific body of rules which differs from the others by its duration and purpose”.⁵⁹ The

⁵⁴ Article 13 of the 24 December 2009 draft Royal Decree amending the 7 March 1995 Royal Decree related to GSM networks, the 24 October 1997 Royal Decree related to DCS 1800 networks, the 18 January 2001 Royal Decree related to UMTS networks and the draft Royal Decree related to wireless access to the 2500-2690MHz frequency band.

⁵⁵ Brussels Court of Appeal Decision R.G. N°.2008/AR/3162.

⁵⁶ Brussels Court of Appeal Decision A.R. N°. 2008/AR/3257.

⁵⁷ BIPT Council Decision dated 25 November 2008 concerning the opposition to the tacit renewal and exploitation of two GSM networks (Mobistar and Proximus) and the network of the DCS 1800 operator (Base).

⁵⁸ BIPT Council Decision concerning the withdrawal of the Decision of the BIPT Council of 25 November 2008 concerning the opposition to the tacit renewal of the authorisation for the establishment and exploitation of the network of the DCS1800 operator (Base).

⁵⁹ Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, § 14. p.9

Court also found that “at the expiration of the current authorisations, no operator will have a vested right to a status quo of its current situation justifying that it could oppose the BIPT will to reorganize the 900MHz band if necessary”.⁶⁰

In the event of tacit renewal of Base’s authorisation, the three existing 2G authorisations would expire between 2015 and 2018. This delay may be unacceptable for market development.

For this reason we recommend a review of the existing tacitly renewed 2G authorisations on the basis of EU law, in particular on the basis of the new EU legal standards.

EU law provides for several legal bases under which a review of such authorisations could be envisaged before the end of the five-year period for which they were renewed. We discuss two potential options:

- use of the Amended GSM Directive
- use of the Amended EU Regulatory Framework

Use of the Amended GSM Directive A review of existing 2G authorisations could be based on the Amended GSM Directive, which establishes new legal standards subsequent to the issuance of the initial authorisations and any tacit renewal. This directive provides for the possibility to review and redistribute existing rights of use of 900MHz frequencies in order to address competition distortions.⁶¹ Article 1.2 of the Amended GSM Directive provides that "Member States shall, when implementing this Directive, examine whether the existing assignment of the 900MHz band to the competing mobile operators in their territory is likely to distort competition in the mobile markets concerned and, where justified and proportionate, they shall address such distortions in accordance with Article 14 of Directive 2002/20/EC."

Thus, the Amended GSM Directive could supply a new legal basis for a review of existing authorisations, even after the Brussels Court of Appeal held that Belgacom Mobile and Mobistar’s authorisations were tacitly renewed under current legal provisions.

This review should be planned by 9 May 2010, the implementation date for the decision.⁶²

However, the organisation of such a review would be subject to two

⁶⁰ Point 37 of the Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, see p.24

⁶¹ Directive 2009/114/EC of the European Parliament and of the Council of 16 September 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community, see Recitals 6 and 7.

⁶² See Article 3 of the Amended GSM Directive which requires Member States to comply with the Directive by 9 May 2010.

conditions:

- Building a solid case in order to demonstrate that the existing assignment in the 900MHz band is likely to distort competition and that reviewing or redistributing existing rights of use would be a justified and proportionate way to avoid competition distortions.
- Organising a public consultation in accordance with Article 14 of the Authorisation Directive requirements for proportionality and objective justification⁶³.

With respect to the standard for whether current authorisations distort competition, under the 2002 EU Regulatory Framework, Article 8 of the Framework Directive already requires Member States to ensure the effective management of radio frequencies in accordance with the objective of promoting competition and ensuring that there is no distortion or restriction of competition. This objective is confirmed and reinforced by the new Article 8(5) of the Amended Framework Directive which provides that, in the pursuit of the general policy objectives, NRAs shall safeguard competition and promote efficient investment and innovation in new and enhanced infrastructures.

This consideration could apply with special force to renewal of the 2G authorisations. As mentioned by the European Commission in the 8 March 2004 Communication Committee working document⁶⁴, Member States should pay particular attention to the promotion of competition and the prevention of competitive distortion when considering the question of the renewal of 2G rights of use. The Commission insists on the “need to encourage efficient investment in infrastructure and to promote innovation”. According to the European Commission, “it is clear that, when

⁶³ See Recitals 6, 7 and Article 1.2 of the Amended GSM Directive.

⁶⁴ European Commission, Communications Committee, Working document on renewal of 2G rights of use, 8 March 2004, COCOM 04-21, §3.5.

⁶⁵ European Commission, Communications Committee, Working document on renewal of 2G rights of use, 8 March 2004, COCOM 04-21, §3.5.

⁶⁶ C-462/99, *Connect Austria*, Judgement of the Court of Justice of 22 May 2003, §83, citing C-202/88, *France v Commission*, Judgement of the Court of Justice of 19 March 1991, §51.

⁶⁷ Brussels Court of Appeal Decision R.G. N°.2008/AR/3162

⁶⁸ Point 37 of the Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, p.24

⁶⁹ Point 37 of the Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, p.26

⁷⁰ At the time of the Brussels Court of Appeal Decision in July 2009, the Amended GSM Directive was not yet adopted.

⁷¹ Point 38 of the Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, p.26

faced with uncertainty as to a renewal process, operators will not be incentivised to efficiently invest or to innovate. Equally a renewal process that does not take into account the prevailing technological and market conditions could risk consolidating the position of incumbents at the expense of new entrants”.⁶⁵

Under Court of Justice case law, “a system of undistorted competition can be guaranteed only if equality of opportunity is secured between the various economic operators”⁶⁶. In the event Base’s authorisation is also tacitly renewed, no opportunity would exist for a potential fourth entrant. If there is a viable case that a fourth operator could seek to enter the market, then this situation could support a finding that competition is distorted so long as the three operators are permitted to hold all available spectrum which, in turn, could justify review under the Amended GSM Directive.

Several statements of the Brussels Court of Appeal Decision dated 20 July 2009,⁶⁷ that annulled the 25 November 2008 BIPT Council Decision that opposed the tacit renewal of the 2G authorisations, would support a potential review of these authorisations under the Amended GSM Directive:

- First, the Court did not challenge BIPT’s justification for refusing to renew 2G authorisations based on the necessity of refarming the 900MHz band for UMTS and for the entry of a fourth operator. The Court found that “BIPT could reasonably consider necessary to harmonise the duration of the three operators’ authorisations for the future and not to be bound by a new duration for authorisations without having had the possibility to seek to accommodate a potential fourth operator, whatever the probability and timing of its entry, reminding that, at the expiration of the current authorisations, no operator will have a vested right to a status quo of its current situation justifying that it could oppose the BIPT will to reorganise the 900MHz band if necessary”.⁶⁸
- The Court found that, since documents produced by BIPT showed the interest of several operators for the fourth license and since the Minister expressed his will to grant 2x5MHz to a new entrant, “the 6 blocks of 2x5MHz are then necessarily insufficient for the entry of a fourth operator and for achieving adequate competition on the market”.⁶⁹

Finally, the Court found that BIPT was right to refer to the Proposal for an amended GSM directive⁷⁰ even if the Proposal had not yet been adopted. By doing this, “BIPT legitimately preserves its rights to act on this basis

without granting to this proposal any binding effect that it does not have".⁷¹

*Use of the
Amended EU
Regulatory
Framework.*

The 2009 EU Regulatory Framework could also provide for other opportunities for Belgian authorities to review existing 2G authorisations. The following provisions would support the review of existing 2G authorisations:

- A general review of existing authorisations could be organised on the basis of Article 17.1 and 2 of the Amended Authorisation Directive by 19 December 2011, or at the latest by 30 September 2012. Article 17.1 provides that Member States shall bring existing individual rights of use already in existence on 31 December 2009 into conformity with Articles 5, 6, 7 and Annex I of the Amended Authorisation Directive by 19 December 2011 at the latest. Article 17.2 provides, however, that, if this results in a reduction of the rights or an extension of existing authorisations, Member States may extend the validity of those authorisations until 30 September 2012 at the latest, provided that the rights of other undertakings under Community law are not affected. Belgian authorities could, in particular, justify amending existing rights of use related in order to comply with the obligation to safeguard efficient use of spectrum provided by Article 5 and Annex condition B.2. of the Amended Authorisation Directive.
- Additional support for a review of existing authorisations could come from Article 9.1 as amended which provides that “taking due account of the fact that radio frequencies are a public good that has an important social, cultural and economic value, Member States shall ensure the effective management of radio frequencies for electronic communication services in their territory in accordance with Articles 8 and 8a”⁷². Article 9.1 also provides for the possibility for Member States to take public policy considerations into account, in particular by its specific reference to Article 8 of the amended Framework Directive, which establish policy objectives and regulatory principles. As highlighted by Recital 24 of the Amended Framework Directive⁷³, the importance of efficient use and effective management of the spectrum is reinforced in the 2009 EU Regulatory Framework. Recital 24 provides in particular that obstacles to the efficient use of the spectrum

⁷² Article 8.2 (d) of the Amended Framework Directive provides that NRAs shall encourage efficient use and ensure the effective management of radio frequencies.

⁷³ Recital 24 of Directive 2009/140/EC states: “Radio frequencies should be considered a scarce public resource that has an important public and market value. It is in the public interest that spectrum is managed as efficiently and effectively as possible from an economic, social and environmental perspective, taking account of the important role of radio spectrum for electronic communications, of the objectives of cultural diversity and media pluralism, and of social and territorial cohesion. Obstacles to its efficient use should therefore be gradually withdrawn.”

should be gradually withdrawn. A review of existing authorisations could be envisaged in order to comply with effective management and efficient use requirements.

The principle of supremacy of EU law⁷⁴ would provide enough room for manoeuvre to Belgian authorities in order to consider reviewing the already tacitly renewed 2G authorisations on the basis of EU law provisions, especially since those legal provisions were adopted subsequent to the tacit renewal. However, Belgian authorities should be particularly cautious when complying with principles of non-discrimination, transparency, objective justification and proportionality.

Whichever of the two options (*Use the Amended GSM Directive; Use the Amended EU Regulatory Framework*) is envisaged by Belgian authorities as a legal ‘hook’ to review the existing 2G authorisations, requirements set forth by Article 14 of the Authorisation Directive⁷⁵ shall be respected when implementing such a review:

- Member States shall ensure that the rights, conditions and procedures concerning rights of use are only amended in objectively justified cases, and in a proportionate manner.
- In addition, notice shall be given in an appropriate manner of the intention to make such amendments and interested parties, including users and consumers, shall be allowed a sufficient period of time to express their views on the proposed amendments (not be less than four weeks except in exceptional circumstances).⁷⁶
- Finally, when Member States restrict or withdraw rights to install facilities before the expiry of the period for which they were granted except, it shall be justified and, where applicable, in conformity with relevant national provisions regarding compensation for withdrawal of rights”.

Article 14 of the Authorisation Directive provides for a relatively short minimum period of notice before reviewing the authorisations. During the course of the consultation and while reviewing the current framework applicable to 2G authorisations, Belgian authorities would have to demonstrate that amending such authorisations is objectively justified and proportionate. Belgium authorities could then rely on one of the two options envisaged above. Finally, if as a consequence of the review, existing rights of use for frequencies are reduced or withdrawn, Belgian authorities would have to comply with existing provisions under Belgian law, if any, applicable to compensation for withdrawing rights.

⁷⁴ E.g. Case 26-62, *Van Gend & Loos*, Judgement of the Court of Justice of 5 February 1963, Case 6/64, *Costa v. ENEL*, Judgement of the Court of Justice of 15 July 1954.

⁷⁵ Article 14 is maintained with technical adjustments in the Amended Authorisation Directive.

⁷⁶ Under Article 14 of the Amended Authorisation Directive, there is no further need for notice and consultation where proposed amendments are minor and have been agreed by the rights holders.

The possibility to amend existing authorisations is confirmed by the Court of First Instance which stated that the “principle of the inviolability” does not appear in Community law. The Court confirmed that “on the contrary, Member States may amend the conditions attached to an individual authorisation in objectively justified cases and in a proportionate manner”.⁷⁷ This position is confirmed by the Court of Justice in its *Bouygues* judgment of 2 April 2009 in the same case.⁷⁸

Operators may well oppose such review on the principle of legal certainty or the protection of legitimate expectations. However, such certainty does not guarantee that legal standards are not changed or business licenses not amended. The Court of Justice has upheld the ability of legislators to make changes in legal structures and authorisations to reach objectives of general interest.⁷⁹ As stated by Advocate General Stix-Hackl, the “principle of legal certainty requires legal rules to be clear and precise, and ensures that situations and legal relationships governed by Community law remain foreseeable. This protection of the *status quo* does not, however, mean that the law cannot be changed. The mere existence of a legal provision is not sufficient, that is it does not, in itself, give grounds for such a belief. Given the legislature’s freedom, Community citizens cannot, according to the case-law of the Court, rely on the preservation of a given situation, which the Community institutions may amend within the parameters of their authority”.⁸⁰

In its 20 July 2009 Decision, the Brussels Court of Appeal confirmed that “at the expiration of the current authorisations, no operator will have a vested right to a status quo of its current situation justifying that it could oppose the BIPT will to reorganize the 900MHz band if necessary”.⁸¹

Introduce more flexibility into new authorisation

In light of the new EU legal structure discussed above, NRAs will soon be required to introduce substantial flexibility in all new authorisations. We recommend that BIPT develop the conditions that will be needed for such authorisations (e.g. 2.6GHz), in order to be ready to apply those new conditions as soon as practicable after the new EU legal standards are applied. In particular, Belgian authorities will need to amend the pertinent Royal Decrees in response to the Amended GSM Directive and 2.6 GHz Decision⁸², and may need to consider further changes in light of the Amended EU Framework Decision.

⁷⁷ Case T-475/04, *Bouygues v. Commission*, §135.

⁷⁸ Case C-431/07, *Bouygues v. Commission*, §124.

⁷⁹ Cf. Joined Cases C-37/02 and C-38/02, *Adriano Di Lenardo Srl v. Ministero del Commercio con l’Estero and Dillexport Srl v. Ministero del Commercio con l’Estero*, 15 July 2004.

⁸⁰ Joined Cases C-37/02 and C-38/02, Opinion of A.G. Stix-Hackl delivered on 20 January 2004, § 88-89.

⁸¹ Point 37 of the Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, see p.24.

⁸² Commission Decision 2008/477/EC on the harmonisation of the 2500-2690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community.

In many respects, this action builds upon the measures to be taken under our preceding recommendation. New conditions must be thoroughly justified and not impose discriminatory requirements. Nevertheless, taking action to implement the EU legal structure as soon as practicable will also provide support for the necessary review of existing authorisations.

2.3.4 Recommendations related to coverage obligations

Coverage obligations should be dealt differently for future and current authorisations.

Coverage obligations for current authorisation

For current mobile authorisations, we recommend the removal of coverage obligations, as operators are most likely to maintain coverage in excess of the current obligation for commercial reason. Removing coverage obligations would be in line with the general move towards service and technology neutrality. However, if Belgian authorities are concerned that removing coverage obligations would reduce operators' incentives to increase or maintain coverage for any specific reason, then coverage obligations may still be applied to these authorisations.

In addition, if Belgian authorities decide to keep coverage obligations for the current authorisations, we recommend that coverage obligations should be linked to the spectrum band and not to the authorisation or to the technology in use (i.e. thus making coverage obligation technology neutral). We believe this is appropriate since the characteristics of the spectrum band i.e. low or high frequency bands (and not the authorisation or technology) are the real elements that constrain or facilitate operators' coverage capacity.

Regarding 3G authorisations, we recommend to consider removing coverage obligations at the time of renewal of these authorisations in order to avoid any discriminatory treatment between existing operators and a new 3G entrant.

Coverage obligations for future authorisation

We generally recommend not to specify any coverage obligations for future authorisations, as operators are usually keen, for economic reasons, to rapidly roll-out their network in order to increase their addressable market. We would, however, identify the following exceptions to our "generic" rule:

- Service-specific authorisation. For example, if it is found appropriate to encourage rapid deployment of a specific service
- Fourth 3G authorisation for principles of non-discrimination as current 3G authorisations include coverage obligations.

2.3.5 Recommendations related to spectrum trading

In order to take into account EU requirements and spectrum scarcity considerations, we recommend to review the existing Belgian legal framework related to spectrum trading as follows:

- Since there is no particular risk of spectrum scarcity in high bands (e.g. over 1GHz), operators should be required to notify BIPT of their intention to trade their spectrum in those bands as well as when the transfer takes place. BIPT would, however, retain the ability to require prior approval on a case-by-case basis.
- The requirement for prior approval from BIPT should, however, be maintained when trading spectrum in low bands (e.g. below 1GHz). This would avoid any anticompetitive behaviour through spectrum hoarding due to the scarcity of spectrum in these bands.
- Prior approval from BIPT should be required in such considerations as a transitional measure, to ensure fair competition.

One issue that may arise where existing operators have the ability to trade their spectrum is the potential for capital gains (or losses), known as ‘windfalls’:

- Windfall gains may arise where the introduction of trading increases the market value of newly tradable usage rights relative to the price that authorisation holders initially had to pay at the time of the primary assignment. When users sell their rights, they will therefore receive more than they originally paid for the spectrum rights.
- Windfall losses may arise where, due to the introduction of trading, the current market value of spectrum rights is lower than the price paid for the licences in the initial assignment. This will occur only in the case of previously service-specific bands where there was a scarcity premium paid for the original rights.

Windfall gains and losses should not be confused with gains or losses in value that have occurred because of unanticipated changes in market demand for spectrum for particular uses. For example, the decrease in value of 3G licences since 2000 owing to the cooling in market sentiment towards 3G technology and services is not a windfall loss. These changes in value due to new information arriving in the market are perfectly normal in the context of a free market. In contrast, windfall gains and losses arise from changes in the scarcity of spectrum arising from changes in constraints on how it may be used.

It should be noted that also the risk of spectrum hoarding is minimised through different mechanisms and therefore does not necessary require specific measures:

- prior approval is currently required by BIPT for spectrum trading in all frequency bands
- annual spectrum fees oblige operators to pay for their spectrum even if they are not using it

Spectrum hoarding does not apply automatically to an operator who owns spectrum but is not using it. Spectrum is considered to be hoarded only if it is affecting market competitiveness and has a negative impact on competitors.

However, there are a number of approaches that BIPT could take to attempt to reduce windfall gains and losses, including:

- making greater use of market-based mechanisms for primary assignment, thus reducing the scope for gains from trading (note, however, that this can only reduce the scope for spectrum trading to create windfalls in the future, and will not affect the conversion of existing authorisations)
- using annual spectrum fees to absorb windfall gains (by increasing them) or compensate windfall losses (by reducing them)
- imposing a tax on windfall gains (for example, in a similar manner to capital gains taxation), in order to recoup some of this money for the government, or allowing tax credits in response to windfall losses. Use the EU-wide latitude provided to NRAs by Article 13 of the Authorisation Directive to consider imposing fees on trading deals providing that such fees reflect the need to ensure the optimal use of the spectrum and are objectively justified, transparent, non-discriminatory, proportionate and take into account the general policy objectives of Article 8 of the Framework Directive.⁸³

These recommendations are based on the following assessment of the existing Belgian legal framework applicable to spectrum trading and of EU law requirements.

► *Belgian legal framework applicable to spectrum trading*

Under the current Belgian legal framework, prior approval from BIPT is required for spectrum trading. Article 19 of the 2005 Law on electronic communications provides that BIPT shall authorize radio frequency trading under certain conditions:

- competition shall not be distorted as a result of any such transaction.
- such transfer shall comply with efficient spectrum management requirements.
- where radio frequency use has been harmonised, spectrum trading shall not result in change of use of that radio frequency.

Modalities of such transfer must be set by decree adopted in Ministers Council after having received BIPT's opinion.

Article 19 is located under Sub-section 2, which applies to “frequencies used in totality or partially for services provided to the public”. As a consequence, spectrum trading is not possible for private services.

A draft Royal Decree on spectrum trading still under preparation implements Article 19 of the 2005 Telecommunications Law as well as Article 9b of the Amended Framework Directive and Article 5 of the Authorisation Directive as amended.

⁸³ For more details on Article 13 requirements, see Section 6.2.4

► *EU law requirements*

Although prior approval by BIPT is required under the existing Belgian framework, the EU Regulatory Framework only requires that the intention to transfer rights to use frequencies as well as the effective transfer are notified in accordance with national procedures to the NRA and made public. NRAs are required to make sure such transactions do not distort competition. In accordance with the Amended EU Regulatory Framework, transitional measures may be imposed in certain circumstances in order to ensure fair competition.

3 Topic 3: Digital dividend

In this section, we first define the digital dividend, introduce the concept of the sub-band (790–862MHz), and present the potential services that could be used in the digital dividend (and the sub-band). We then present the current situation in Belgium regarding the use of this sub-band. Finally, we present our recommendations.

3.1 Digital dividend and potential services

3.1.1 Digital dividend

The digital dividend (470–862MHz) refers to the release of spectrum as a result of the migration from analogue to digital TV channels. The UHF band, and in particular 470–862MHz, is widely regarded as some of the most valuable radio spectrum. This is because this spectrum provides a balance between equipment characteristics (e.g. size of antenna), coverage, capacity and propagation which are much more efficient than other frequency bands.

The European Commission defines digital dividend spectrum as “...the spectrum over and above the frequencies required to support existing broadcasting services in a fully digital environment, including current public service obligations”.⁸⁴

In almost all Member States, the existing national analogue TV programming channels could be carried on a single digital multiplex. This means that the digital dividend could, in theory, be around 320MHz⁸⁵ for most Member States. In practice, this amount of highly valuable spectrum is not available, and the term 'digital dividend' remains subject to interpretation in most countries:

- Ofcom (UK) defines the digital dividend as being the spectrum available over and above the spectrum required to deploy six digital terrestrial TV (DTT) multiplexes across the UK
- In France, the government defines the digital dividend as the spectrum available over and above the spectrum required to deploy the seven current DTT multiplexes across the country which are currently planned (six DTT multiplexes and one broadcast mobile TV multiplex)

The sub-band that is the higher part of the digital dividend (790–862MHz) has been identified as the part of the digital dividend spectrum that could be harmonised for mobile communications at the WRC-07.

⁸⁴ COM(2007) 700 final, Commission of the European Communities, “Reaping the full benefits of the digital dividend in Europe: A common approach to the use of the spectrum released by the digital switchover”, 13 November 2007.

⁸⁵ The UHF band consists of 392MHz of spectrum. The amount of spectrum required for one multiplex can vary significantly, from just 8MHz for a nationwide SFN, to more than 72MHz for a MFN. This means that at least 320MHz amount of spectrum will be available if using one multiplex.

3.1.2 Main uses for the digital dividend

There are a number of potential uses for the digital dividend including mainly:

- DTT
- broadcast mobile TV
- wireless broadband services, both to fixed locations and to mobile devices
- programme making and special events (PMSE)
- emergency and security services
- licence-exempt services/cognitive technologies.

These services are presented below.

DTT

A potential use of the digital dividend is the deployment of additional digital terrestrial video broadcasting multiplexes (DVB-T) to provide national or regional TV services.

A DVB-T multiplex is essentially a ‘pipe’ for DTT transmission. It has a given bit rate capacity which, in practice, ranges between 8Mbit/s and 27Mbit/s, depending on the modulation level used (e.g. QPSK-2/3 or 64QAM-3/4). In principle, a multiplex can deliver any picture quality, including high definition TV (HDTV).

HDTV requires approximately three times the capacity of standard definition TV (SDTV). SDTV programming channels can be carried using a 3.2Mbit/s data rate using MPEG-2 compression. Using the more advanced MPEG-4 compression should allow an HDTV programming channel to be carried using a 10Mbit/s data rate by 2009/2010 and 8Mbit/s in 2011/2012.

One multiplex in 2009 can typically carry around three HDTV programming channels or eight SDTV programming channels (using MPEG-4 compression technology, and DVB-T).

Mobile TV

The digital dividend could also be used to provide broadcast mobile TV services. Broadcast mobile TV is linear, multicast, multi-channel service with a format similar to non-mobile broadcast TV. Mobile TV would require dedicated mobile broadcast networks, which are currently available in only a few European countries, including Italy and the Netherlands.

Broadcast mobile TV services can be provided using a number of technologies including:

- Digital video broadcasting for handhelds (DVB-H) - In March 2008, the European Commission adopted a strategy favouring the take-up of mobile TV across the Member States. The strategy is based on a

common European standard for mobile TV (DVB-H). Networks have already been deployed in the 470–862MHz band in a number of European countries, including Finland, Germany and Italy.

- Digital multimedia broadcast (DMB) – Originally developed in Asia, DMB builds on the digital audio broadcast (DAB) standard developed for digital radio transmission. While there are no live DMB networks in Europe at present, trials have been undertaken in a number of countries. It is typically designed to operate in frequency bands designated for DAB i.e. 174–230MHz and 1452–1492MHz (L-Band)
- MediaFLO - Qualcomm's proprietary technology. Following trials in the USA and Europe, Qualcomm claims that MediaFLO can either offer more channels in the same spectrum (e.g. 30 compared to 15–20 with DVB-H in a 8MHz channel) or can offer an equivalent number of channels using less spectrum than DVB-H. Qualcomm was successful in gaining spectrum in the L-Band (1452–1492MHz) in the UK in an auction that took place in 2008. Commercial service has not yet been launched.

*Wireless
broadband services*

The digital dividend could be used to provide wireless broadband services to fixed locations or to mobile terminals. The favourable propagation characteristics of the digital dividend spectrum mean that it could be used to increase rural coverage or provide in-building coverage. There are two main technologies that could be used to provide this service.

- **UMTS (with HSPA/HSPA+)/LTE** UMTS is widely deployed across Europe in the 2.1GHz band and is being introduced in existing 2G bands (e.g. 900MHz) in some countries. If deployed with HSPA, data services are offered at speeds of up to 7.2Mbit/s (actual speeds in 2009 are usually lower). Speeds of 14.4Mbit/s may be possible in future releases of HSPA, and HSPA+ will offer even higher speeds. LTE is an evolution of the international 3GPP project to improve the current UMTS standard. LTE is likely to be significantly faster than current UMTS/HSPA networks, potentially up to around 100Mbit/s (however, actual speeds are likely to be lower). LTE will offer time division duplex (TDD) and frequency division duplex (FDD) profiles, but is most likely to be deployed initially using FDD. LTE delivers better performance partially due to the use of larger channel bandwidths, and is expected to be deployed by mobile operators using channel widths of up to 40MHz duplex.
- **WiMAX**. Originally developed as a fixed–wireless access (FWA) technology (IEEE802.16d), WiMAX was later revised for mobile use (IEEE 802.16e). The mobile version of WiMAX is likely to offer speeds similar to HSPA. Although WiMAX offers both TDD and FDD, the

most likely deployment will use TDD.

*Program making
and special events
(PMSE)*

PMSE use the 470–860MHz range in most of European countries. Users vary widely, from professionals (e.g. broadcasters, music concerts) to community users (e.g. theatres, schools.). PMSE applications in the 470–860MHz range include radio microphones, in-ear monitors and audio links.

*Emergency and
security services*

Emergency and security services users include emergency services of police, fire, ambulance, as well as security and customs and border control and the lifeboat service.

*Licence-exempt
services/cognitive
technologies*

Licence-exempt applications include a variety of wireless services such as wireless ‘last-metre’ applications, safety-of-life applications, ‘intelligent’ highways, automated buildings, medical sensors, etc. In the future, licence-exempt services may include systems that will use ‘detect and avoid’ (cognitive radio) techniques to share frequencies with other uses.

Cognitive devices have the potential to support a wide range of uses, including short-range, high-speed always-on broadband and are particularly suited to using interleaved spectrum.

Alternatively, cognitive devices measure their location and make use of a ‘geo-location’ database to determine what spectrum they can use at their current location.

It should be noted that technical conditions to facilitate introduction of cognitive radio technologies are part of ongoing study within CEPT and the ITU in preparation for WRC-11.

Each of the potential uses identified above has different spectrum requirements. In the following table, we show the typical channel width (per operator), quantity of spectrum required, channel configuration and constraints for each of these potential uses.

| <i>Use</i> | <i>Channel width (of a single channel)</i> | <i>Typical quantity of spectrum per operator</i> | <i>Channel configuration</i> | <i>Constraints</i> |
|-----------------------------------|---|--|--|--|
| DTT | 8MHz | 8MHz for an SFN Up to 96MHz for an MFN | 8MHz downlink channel | International coordination requirements are covered by the GE-06 agreement |
| Broadcast mobile TV | 8MHz | 8–24MHz, depending whether SFN or MFN | 8MHz downlink channel | Requirement for contiguous bands will depend on network configuration (i.e. SFN or MFN) |
| Wireless broadband | Depends on the technology used, for example: UMTS: 2×5MHz (LTE: from 2×1.25MHz to 2×20MHz) WiMAX: Channel width from 1.25MHz to 20MHz (depending on required data rate) | Up to 40MHz | Depends on the technology used, for example: UMTS: Most likely 5MHz Frequency Division Duplex (paired) channel WiMAX: Most likely 10MHz TDD (unpaired) channel | Requires spectrum in contiguous bands |
| PMSE | 200kHz | Variable, depending on number of devices in operation in the same geographic area. | In bands of contiguous or non-contiguous 200kHz single frequency channels | Talkback systems are sometimes two-way duplex (e.g. 80MHz typical duplex spacing). When interleaved with DTT |
| Emergencies and security services | 25kHz, 50kHz, 100kHz or 150kHz) | Up to 2×15MHz | Multiples of 25kHz paired (FDD) | Technical characteristics and standards not defined at this stage |
| Cognitive radio | total spectral bandwidth is limited to 8MHz | N×8MHz | 8MHz unpaired channels | Technical characteristics and standards not defined at this stage |

Figure 3.1: Spectrum requirements for different uses [Source: Analysys Mason]

3.1.3 Current plans in Europe regarding the use of the sub-band (790–862MHz)

There is a European trend towards an allocation of the sub-band (790–862MHz) to telecoms services, as presented in the table below.

| | |
|---|---|
| <i>Plans to award the sub-band to telecoms services</i> | Denmark, Finland, France, Germany, the Netherlands, Spain, Sweden and the UK |
| <i>Sub-band potentially awarded for telecoms services</i> | The Czech Republic, Ireland, Hungary, Luxembourg, and Slovakia |
| <i>Undecided on the use of the sub-band</i> | Austria, Belgium, Bulgaria, Cyprus, Estonia, Greece, Italy, Latvia, Lithuania, Poland, Portugal, Romania and Slovenia |
| <i>Plans to award the sub-band to DTT</i> | Malta |

3.1.4 Commission Recommendation on the digital dividend and pending Radio Spectrum Committee 800MHz Decision

On 28 October 2009, the European Commission adopted a recommendation⁸⁶ pursuant that Member States should take all measures necessary to ensure that all terrestrial television broadcasting services use digital transmission technology and cease using analogue transmission technology on their territory by 1 January 2012. Under this recommendation, Member States should support regulatory efforts towards harmonised conditions of use of the 790-862MHz sub-band for electronic communications services.

The Commission plans to adopt in 2010 a decision prepared by the Radio Spectrum Committee setting forth the harmonised technical conditions for the future use of the 790-862MHz sub-band by low and medium-power terrestrial systems capable of providing electronic communications services in the Community.⁸⁷ The draft Decision notably provides that Member States shall facilitate cross-border coordination agreements with the aim of enabling the operation of those systems, taking into account existing regulatory procedures and rights.⁸⁸

⁸⁶ Commission Recommendation of 28 October 2009 facilitating the release of the digital dividend in the European Union (2009/848/EC).

⁸⁷ Radio Spectrum Committee, Working document, Draft of a Commission Decision on the 800 MHz band, RSCOM09-59 rev2, 11 December 2009, Article 2(1): “When they designate or make available the 800 MHz band for networks other than high-power broadcasting networks, Member States shall do so, on a non-exclusive basis, for terrestrial systems capable of providing electronic communications services in compliance with the parameters set out in the Annex of this Decision”.

⁸⁸ Article 2(3) of the Draft of a Commission Decision on the 800 MHz band.

3.2 Situation in Belgium regarding the use of the sub-band (790–862MHz)

3.2.1 Technical aspects

The ITU GE-06 plan establishes a plan containing frequency allotments and assignments for DTT in VHF Band III (174–230MHz), UHF Bands IV/V (470–862MHz) and DAB in VHF Band III (174–230MHz) implementation across Europe.⁸⁹ Significant work went into planning for the GE-06 conference, which took place in Geneva in 2006.

The GE-06 plan details transmitter parameters with respect to each country in the plan, along with associated coordination requirements. Modifications to the GE-06 plan can be agreed based upon coordination via the ITU to neighbouring countries, and such adjustments are normally contained in separate bilateral or multilateral agreements between the countries concerned.

Under GE-06, Belgium has allotments in Channels 21–69 of UHF Bands IV and V. Channels 61 to 69 correspond to 790–862MHz. In line with the GE-06 agreement, these allotments can be converted to assignments for Belgium once the actual network design of the DTT (or mobile TV) network(s) are confirmed.

Illustrations of the boundaries of each of Belgium's allotments in Channels 61–69 in the GE06 agreement are provided in the figures below.

⁸⁹ An allotment is characterised by an assigned frequency, an allotment boundary, a type of reference network (RN) and a reference-planning configuration (RPC), with the actual network design left open. In an assignment, all technical characteristics are fully defined within the plan, including sites, power and antenna characteristics. An allotment can be converted to an assignment through notification according to Article 5 of the GE06 agreement.

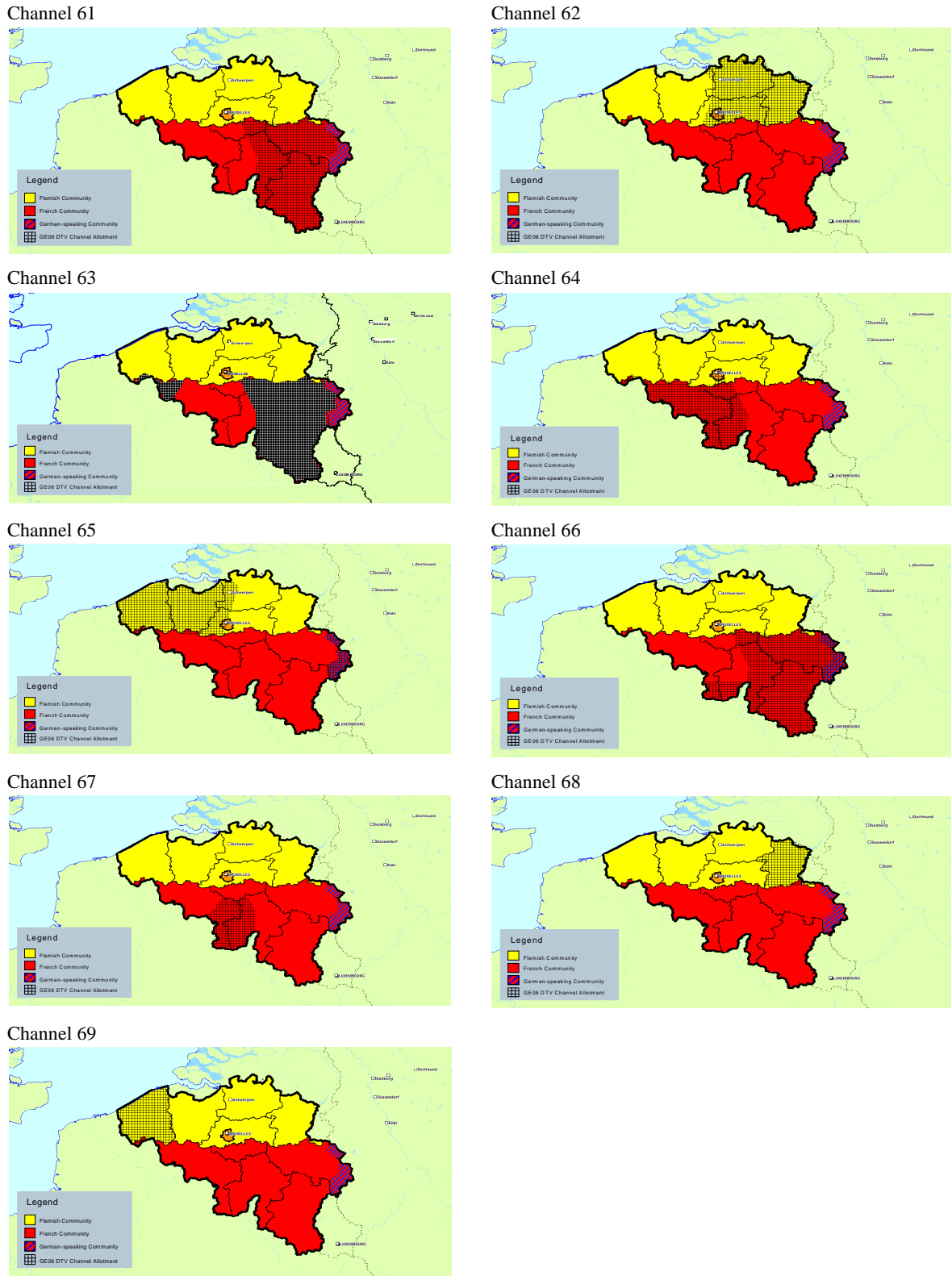


Figure 3.2: Belgium's allotments in Channels 61–69 [Source: Analysys Mason, BIPT]

These allotments secure Belgium the rights, subject to subsequent bi-lateral agreements, to:

- use the relevant DTT channels in the defined areas
- be protected from international interference in these areas.

We understand that at least six multiplexes are being planned across Belgium as a whole in the UHF band:

- In the French community, one multiplex is already operating and a public consultation was performed in 2009.
- In the Flemish community, one multiplex is already operating by VRT and a further five/six were awarded by beauty contest to Norkring België.

We also understand that multiplexes will be operated using single frequency networks (SFN).

Under the GE-06 plan, Belgium’s neighbouring countries (France, UK, Netherlands, Germany, Luxembourg) have also secured DTT allotments and assignments for use within their own territories. If GE-06 assignments are to be changed, there are more detailed bilateral and multilateral discussions that need to take place to agree upon the technical characteristics of the proposed assignment.

Belgium has nine allotments within the sub-band, split between the three communities, but only one assignment is in use. The population coverage represented by each different allotment is shown below.

| <i>Channel</i> | <i>Communities covered</i> | <i>Population coverage of existing GE-06 assignment</i> | <i>Coverage as % of total Belgian population</i> | <i>Programme(s) implemented</i> |
|----------------|-----------------------------|---|--|---------------------------------|
| 61 | French | 1 508 171 | 14.9% | - |
| 62 | Flemish | 4 237 253 | 42.0% | - |
| 63 | French | 1 702 736 | 16.9% | - |
| 64 | French | 2 683 273 | 26.6% | - |
| 65 | Flemish and German speaking | 4 268 689 | 42.3% | - |
| 66 | French and German-speaking | 1 623 308 | 16.1% | RTBF |
| 67 | French | 713 918 | 7.0% | - |
| 68 | Flemish | 789 673 | 7.8% | - |
| 69 | Flemish | 1 114 398 | 11.0% | - |

Figure 3.3: *Distribution of channels within the sub-band [Source: BIPT, Analysys Mason]*

In order to release the sub-band 790–862MHz for mobile use, it is clear from the figure above that allotments with assigned channels within Channels 61–69, planned for broadcast networks in Belgium under the GE06 agreement, would need to be reallocated. To release the sub-band 790–862MHz, Belgium would need to find alternative channels in order to re-locate existing DTT

assignments from the sub-band to elsewhere in the 470–790MHz range. The release of the sub-band should take into account that:

- re-located DTT assignments would need to be accommodated within the remaining UHF spectrum (Channels 21–60)
- changes proposed to GE-06 assignments by Belgium will then affect neighbouring countries, which may also need to change as a result.

We note that some of Belgium’s neighbours (e.g. France and UK) have already indicated that they wish to release the sub-band, and so will wish to re-negotiate border agreements with Belgium. This may present an opportunity for the BIPT to propose release of the sub-band in Belgium with the French and UK regulators in order to reach a common solution. There will also be some advantages to France and the UK if Belgium releases the sub-band for mobile use:

- Reduction in incoming interference from Belgium to mobile networks operating in the sub-band in border areas of UK and France, as a result of the typically lower power levels and site heights of mobile networks compared to DTT. This would increase the overall attractiveness for use of the sub-band in those countries.
- Less complex multilateral agreement relating to the sub-band (assuming that common uplink and downlink frequencies are used) in comparison to ‘mixed’ coordination between mobile networks and DTT.

The feasibility of releasing the sub-band will principally depend on alternative channels being available in the remainder of the UHF band (i.e. 470–790MHz) to accommodate the displaced allotments. We note that the UK and France may also be seeking to accommodate additional DTT assignments within the 470–862MHz band and so this suggests that further detailed technical planning will be required, which may take time to complete. We recommend BIPT to undertake technical work, since, as more countries clear the sub-band, Channels 21–60 will be used more extensively than envisaged in the GE-06 plan. This could result in, for instance, higher levels of interference being received in Belgium from other countries, which is one of the key risk to be addressed by BIPT, in conjunction with community regulators and broadcasters.

3.2.2 Legal aspects

In Belgium, the distribution of competences between telecommunications and broadcasting is complex and in particular affects spectrum regulation.

Whereas telecommunications is a Federal competence⁹⁰, broadcasting is within the competence of the Communities⁹¹ with the exception of the BIPT competence in the Brussels-Capital region for

⁹⁰ Under the Belgian Federal system, Communities and regions have competences expressly granted by the Belgian Constitution whereas the Federal State has residual competences.

⁹¹ Broadcasting belongs to « cultural affairs », competence that the Belgian Constitution has expressly granted to the Communities (Articles 127 and 130 of the Belgian Constitution). This has been confirmed by the Arbitration Court in its decision 132/2004 dated 14 July 2004.

bi-cultural services, which are not within the scope of exclusive competence of the French, German-speaking or Flemish Communities.⁹²

The Belgian Arbitration Court (which became the Constitutional Court in 2007) specified that the Communities are competent regarding “technical aspects of transmission which are accessories of television and radio broadcasting”.⁹³ The Court provided an extensive definition of broadcasting, holding that it covers communications containing public information intended for the whole of the public or of part thereof, which are not confidential and which are considered as programs, i.e. being formed by a final editing.⁹⁴

In 2004, the Arbitration Court recognized the growing convergence of broadcasting and telecommunications infrastructure and the need to take common decisions related to electronic communications networks⁹⁵. As strongly encouraged by the Arbitration Court, a cooperation agreement was adopted between the Federal State and the Communities on 17 November 2006. According to this agreement, Communities and Federal regulatory authorities must communicate to each other their draft decisions related to electronic communications networks in order to be able to verify that their respective scope of competences is respected. In 2006, the Arbitration Court extended this principle to electronic communications services.⁹⁶

Regarding frequency management, the Arbitration Court affirmed that Communities are competent to award broadcasting frequencies within the territory of their respective linguistic region⁹⁷. The Court insisted on the fact that the Federal State is competent regarding “general spectrum policy”, which includes in particular, “without prejudice to Communities competences, the competence to elaborate technical rules related to frequency award that should be common to all radiocommunications whatever their destination is, as well as the competence regarding technical control and the enforcement of those rules”.⁹⁸

The Federal competence related to “general spectrum policy” is exercised both by BIPT and the federal government. According to Article 13 of the Law on electronic communications⁹⁹, BIPT is

⁹² Law dated March 2007 amending the Law dated 30 March 1995 concerning broadcasting networks and activities in the bilingual region of Brussels Capital and amending the Law dated 17 January 2003, related to the status of the regulatory authority of Belgian post and telecommunications.

⁹³ Arbitration Court, Decision 109/2000, 31 October 2000, § B.5.2. « les aspects technique de la transmission qui sont un accessoire de la radiodiffusion et de la télévision ».

⁹⁴ Arbitration Court, Decision 109/2000, 31 October 2000, § B.5.4. « les programmes destinés au public en général ou à une partie de celui-ci, même si l'émission se fait sur demande individuelle [pour autant cependant qu'il ne s'agit pas d'] information individualisée ou à caractère confidentiel ».

⁹⁵ Arbitration Court, Decision 132/2004 dated 14 July 2004.

⁹⁶ Arbitration Court, Decision dated 8 November 2006.

⁹⁷ See in particular p. 3 of the BIPT Opinion on regionalisation of telecommunications dated 17 January 2008.

⁹⁸ Arbitration Court, Case n°1/91, 7 February 1991, §B.5.

⁹⁹ Law on electronic communications dated 13 June 2005.

responsible for spectrum management, for examining requests for frequency use (except for broadcasting), for national and international coordination and control of frequency use BIPT is also competent regarding resolution of harmful interferences.¹⁰⁰

In its 20 July 2009 Decision, the Brussels Court of Appeal acknowledged BIPT spectrum management competence under Article 13 of the 2005 Electronic Communications Law.¹⁰¹

Article 14 provides that technical rules for the use of frequencies not dedicated to broadcasting as well as technical rules related to the award of frequencies dedicated to broadcasting, but which should be common to all radiocommunications whatever their destination, are fixed by Royal Decree, after consultation of the Communities.

On the basis of this complex competence distribution, the digital dividend debate in Belgium raises several legal and political issues.

Neither legal instruments nor the Arbitration Court case law clearly states whether the competence to re-allocate the digital dividend frequencies belongs to the “general spectrum policy” of the Federal State or if such issue must be dealt with through a common decision in accordance with the cooperation process set forth between the Federal State and the Communities. At present, each Community has its own frequency plan. The distribution of technical competence can raise important political questions. Even if operators and industry in general understand the economic rationale for granting a part of the digital dividend broadcasting frequencies to mobile electronic communications services, Communities may be reluctant to give up a part of the frequencies on which they have competencies.

3.3 Recommendations

This section is structured as follows:

- Summary of our main recommendations
- Recommendations related to the creation of the sub-band
- Recommendations related the allocation of the sub-band
- Recommendations related to the award of the sub-band.

3.3.1 Summary

Our main recommendations can be summarised as follows:

- Allocate the sub-band to telecoms services (T3-1)
- Reach a decision through a cooperation process between competent NRAs (T3-2)
- Develop a new spectrum plan for UHF bands IV and V (T3-3)

¹⁰⁰ Article 15 of the Law on electronic communications.

¹⁰¹ Point 28, Brussels Court of Appeal Decision of 20 July 2009, R.G.N°:2008/AR/3162.

- Adopt a cooperation agreement with the Communities regarding coordination of broadcasting frequencies in order to facilitate international coordination to free the sub-band (T3-4)
- Award spectrum on national basis in 2011 (T3-5).

These recommendations are detailed in the following sections.

3.3.2 Recommendations related to the creation of the sub-band

Allocate the sub-band to telecoms services

We recommend to award the sub-band to telecoms services rather than to broadcasting services, on the basis of the quantitative and qualitative analysis, presented below, in compliance with parameters set out in the Annex to draft Commission Decision on 800MHz to be adopted at the beginning of 2010.

► *Quantitative analysis*

We have performed a high-level assessment of the private value that would derive from the main potential uses of the sub-band, which are telecoms (mobile services) and broadcasting (DTT).

The private value is the direct benefit to individuals from their own consumption of a service (i.e. the value consumers place on the service), less the costs of producing that service. In economic terms, this is equal to the sum of consumer and producer surplus.¹⁰²

It should be noted that in the context of our work, we have based our economic assessment on the grounds of the economic valuation performed in other countries, which we have extrapolated for Belgium. Although, our economic assessment is not specifically designed for the Belgian market¹⁰³, we believe that this analysis provides relevant inputs and quantification, which can serve as a basis for a comparison of the economic value of the sub-band use for telecoms and broadcasting services.

The result of this analysis shows that the use of the sub-band for telecoms is more economically efficient than for broadcasting.

¹⁰² Consumer surplus is the economic benefit to consumers, derived from the fact that the market price paid by consumers for goods or services tends to be lower than the maximum amount they would be prepared to pay for them (willingness to pay).

Producer surplus is the economic benefit for suppliers based on the fact that they would be prepared to sell a specific good at a lower price than consumers are in fact paying. In a competitive environment, the cheapest price a producer would sell his product would be “at cost”. We can consider that the producer surplus is equivalent to the producer earnings.

¹⁰³ We have performed specific models for numerous governments or regulators (France, UK and the Netherlands) in order to achieve a detailed quantification but this assignment takes at least 2 to 3 months and requires a considerable amount of work.

We have considered four major public studies¹⁰⁴ and extracted the resulting values:

- per MHz, per population (for the valuation of telecoms services)
- per multiplex per population (for the valuation of DTT).

We have then considered that the sub-band is characterised by:

- 72MHz (for telecoms services)
- the use of two multiplex for DTT (as each SFN multiplex requires between 3 to 4 frequencies¹⁰⁵).

Based on this analysis, the value of the sub-band used for telecoms services appears to be more than 4 times higher than for DTT, as shown in Figure 3.4. It should also be noted that in all studies done to date, the economic value of the use of the sub band for telecoms services is significantly higher for telecoms than for broadcasting services (with a ratio always above 2 in all studies).

¹⁰⁴ 1) Analysys Mason, DotEcon and Aegis Spectrum Engineering's study for Ofcom on the potential for adjacent channel interference between different combinations of technologies using digital dividend spectrum. 2) Analysys Mason and Hogan & Hartson's digital dividend study for ARCEP on the economic benefit that could be generated from the digital dividend. 3) Spectrum Value Partners' digital dividend study for Ericsson, Nokia, Orange, Telefónica and Vodafone on allocating UHF spectrum to maximise benefits for European society. 4) Analysys Mason study for the Ministry of Economic Affairs in the Netherlands on the economic and social limitations to alternative uses of 'digital dividend' spectrum. 5) Analysys Mason, dot.econ and Hogan & Hartson's study for the European Commission on Exploiting the digital dividend – A European approach

¹⁰⁵ Digital Switchover in Broadcasting – A BIPE Consulting Study for the European Commission (Directorate General Information Society).

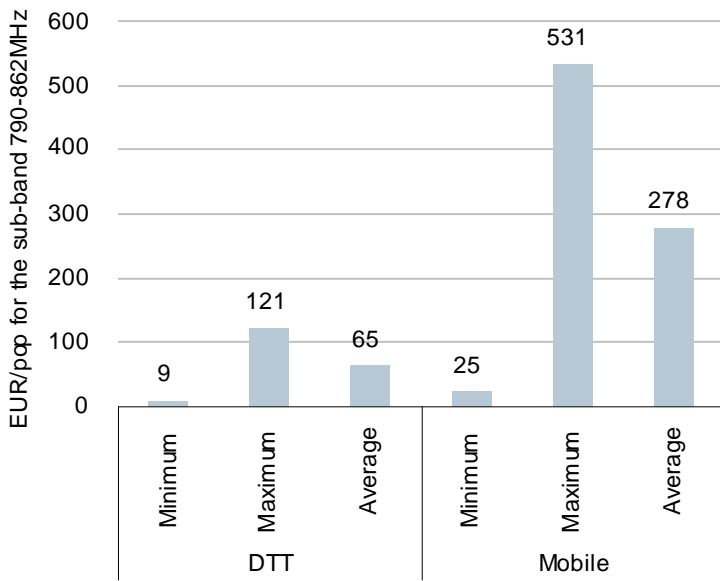


Figure 3.4: High-level comparison the sub-band economic value over 15 years per population [Source: Analysys Mason]

We can then extrapolate, as presented in Figure 3.5, the private value (over 15 years) of the sub-band in Belgium. The value of the sub-band is:

- EUR681 million, if used for DTT
- EUR2922 million, if used for telecoms services

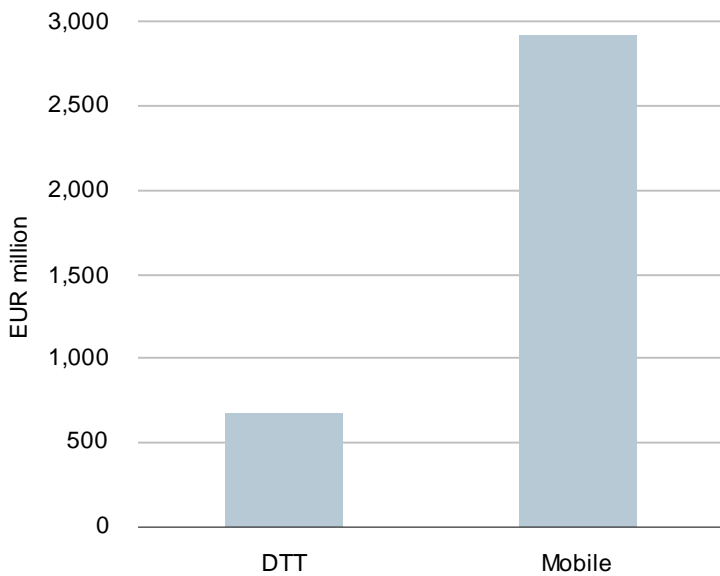


Figure 3.5: High-level comparison of private value over 15 years for Belgium [Source: Analysys Mason]

► *Qualitative analysis*

The use of the sub-band for telecoms services also has strong qualitative benefits (in comparison to broadcasting services) such as:

- decreasing the digital divide between urban and rural areas through access to mobile telephony and broadband services

- innovation benefits owing to more rapid adoption of new services and technologies, and greater opportunity for European-based innovations
- supporting local broadband initiatives (either as an alternative or complement to other technologies, such as fibre)
- promoting quality of life through access to new technologies and ability to work from home.

Reach a decision through a cooperation process between competent NRAs

On the basis of the Belgian legal framework and taking into account EU law requirements, we recommend that the digital dividend allocation (including the use of the sub band) be decided by competent NRAs through a cooperation process.

Article 9 of the 2002 Framework Directive provides that Member States shall ensure that “the allocation and assignment of radio frequencies by NRAs¹⁰⁶ are based on objective, transparent, non-discriminatory and proportionate criteria”.

The amended version of Article 9 in the 2009 EU Regulatory Framework essentially repeats this provision and specifies that Member States “shall ensure that spectrum allocation used for electronic communications services (...) by competent national authorities are based on objective, transparent, non-discriminatory and proportionate criteria”.

Article 3 of the 2002 Framework Directive provides:

- “Member States shall ensure that each of the tasks assigned to national regulatory authorities in this Directive and the Specific Directives is undertaken by a competent body.”
- “Member States shall ensure that national regulatory authorities exercise their powers impartially and transparently.”

The amended version of Article 3 in the 2009 EU Regulatory Framework adds that Member States shall ensure that NRAs should exercise their powers “in a timely manner” and “have adequate financial and human resources to carry out the tasks assigned to them”.¹⁰⁷

The importance of NRAs’ independence is also affirmed by the recent opinion of Advocate General Poiares Maduro, finding that “national regulatory authorities have been set up and given particular powers by the Community Framework for a reason: they are expected to be insulated from certain interests and to reach their decision governed only by the criteria established in the framework”.¹⁰⁸ The independence of NRAs was reaffirmed by the Court of Justice on 3 December

¹⁰⁶ Under Article 2 (g) « Definitions » of the Framework Directive, national regulatory authority means the body or bodies charged by a Member State with any regulatory tasks assigned in this Directive and the specific Directives”.

¹⁰⁷ Article 3(3) of the Amended Framework Directive.

¹⁰⁸ Opinion of Advocate General Poiares Maduro delivered on 23 April 2009, Case C-424/07, *Commission v. Germany*, §63.

2009 which in particular emphasized that NRA independence should not be constrained by national legislation.¹⁰⁹

Taking into account the complex distribution of competences between the Federal State and the Communities, the digital dividend should be reallocated through a cooperation process between competent regulatory authorities at the federal and community level.

3.3.3 Recommendations related to the allocation of the sub-band

Develop a new spectrum plan for UHF bands IV and V

To free the sub-band, a technical study of planning assumptions and frequency coordination requirements is needed to assess scope for further DTT channels being accommodated in blocks 21–60. This study should take into account both the balance of DTT requirements across different communities in Belgium, as well as requirements to re-negotiate border agreements with the regulators of neighbouring countries.

We believe that the main factors determining the technical feasibility of finding a solution for a re-plan of Belgium's GE-06 assignments are:

- Finding suitable frequencies for DTT without requiring significant re-planning/switching off analogue transmitters during the migration period.
 - The broadcasters should be consulted about incoming interference levels from existing analogue TV services to DTT, and how this affects use of Channels 21–60 during the switchover.
- Ensuring continued spectrum availability and protection of services other than DTT using channels outside of the sub-band (e.g. wireless microphones, radio astronomy, defence).
- Ensuring revised DTT coverage plans, which can deliver the required minimum field strength for DTT reception at the required percentage of locations in each community.
 - This is achieved by defining a protection 'margin', which is a policy decision for the BIPT and community regulators to take. This margin represents the allowance provided within the DTT link budget over and above the DTT receiver sensitivity to account for potential interference. In practice, this will affect the coverage area assumed for each DTT transmitter:
 - A higher protection margin e.g. 15–20dB is needed to ensure DTT reception at 95% of locations, which would imply an increase in the number of DTT sites required, or a requirement for additional in-fill sites.
 - A lower protection margin e.g. 7–10dB, could be acceptable if a lower coverage probability can be accepted e.g. to 70% of locations. This implies that DTT coverage areas can be assumed to be larger than if a higher margin is required.

¹⁰⁹

Case 424/07, *Commission v. Germany*, judgment of 3 December 2009, see §99 in particular.

- Achieving the necessary bilateral and multilateral re-negotiations with neighbouring countries.

We recommend that a new spectrum plan should be developed for UHF Band IV and V. A technical study is required to achieve this, in order to investigate planning assumptions and frequency coordination requirements. The scope of this potential technical study is developed further below:

- Determine which channels are available to accommodate the DTT channels re-assigned from 61 to 69. This will require identification of up to nine new frequencies for use between 470MHz and 790MHz (Channels 21–60). Major technical assumptions needed will be:
 - minimum signal strength required for DTT reception
 - modulation option assumed (DVB-T 8k mode recommended for SFN planning)
 - protection levels necessary to avoid co-channel and adjacent channel interference
 - margins required to ensure minimum level of coverage to the agreed percentage of population (a policy decision)
 - We would like to emphasize that re-planning could provide an opportunity to plan for advanced services (e.g. HDTV) or technologies (e.g. DVB-T2).
- Using a suitable radio planning tool with digital terrain data (DTM) of Belgium and neighbouring countries, undertake field strength prediction and interference analysis to confirm a new frequency plan for each site being used to deliver DTT coverage, based upon:
 - planned channel use
 - confirmed power levels of main sites
 - antenna radiation patterns at each main site.
- The process of clearing Channels 61–69 should be implemented in conjunction with broadcasters within each community in Belgium. We recommend that BIPT consults each broadcaster to determine the practicality of proposed frequency moves. Key issues are:
 - the need to ensure that viewers continue to receive a non-interrupted service during the migration
 - the need to plan migration without requiring extensive infrastructure re-engineering.

Adopt a cooperation agreement with the Communities regarding coordination of broadcasting frequencies in order to facilitate international coordination to free the sub-band

In order to facilitate international coordination to free the sub-band, we recommend the adoption of a cooperation agreement with the Communities regarding coordination of broadcasting frequencies.

Article 17 of the 2005 Law on electronic communications provides that a cooperation agreement with the Communities shall govern coordination of broadcasting frequencies. However, this agreement has never been concluded. As a consequence, no rule sets forth the process to follow regarding cooperation between BIPT and the Community regulators regarding coordination with neighbouring countries.

The reallocation of the digital dividend will require such coordination activities. In order to facilitate negotiations with neighbouring countries, we therefore recommend the adoption of a cooperation agreement with the Communities regarding coordination of broadcasting frequencies, as provided by Article 17 of the 2005 Law.

The adoption of this cooperation agreement is likely to be required for consistency with the draft of a Commission Decision on 800MHz which provides that Member States shall facilitate cross-border coordination agreements with the aim of enabling the operation of those systems, taking into account existing regulatory procedures and rights¹¹⁰.

3.3.4 Recommendations related to the award of the sub-band

Award spectrum on national basis

We recommend to award the sub-band to telecoms services on a national basis. We believe that this is key for the mobile operators that will roll out networks and provide telecoms services on a national basis.

The preferred award mechanism is an auction. The auction details should be set to encourage new entrants and should provide visibility to operators that could then take into account the availability of this low spectrum band (adapted for coverage) in the planning of their activity. We therefore recommend that the award of spectrum happen in 2011. In addition, it is important that operators have good visibility of spectrum release dates in each community. It should be noted that the analogue switch-off happened in November 2008 in the Flemish community and that the switch off in the French community is expected to happen by the end of 2010.

We suggest that the auction timing be set after providing visibility on the 900MHz band, in order to clarify the award of low-band spectrum, which is crucial for network rollout. No specific auctions for this band have yet been held in Europe, however, we believe that a clock auction with 5MHz spectrum packages may be appropriate to award the digital dividend spectrum.

Compensation for channels lost to communities/broadcasters could be taken into account by providing them a share of the financial results of the auction.

It should also be noted that operators need to have visibility on equipment availability in this band, and that there needs to be coordination between the different communities, the federal government and the neighbouring countries, which may delay our proposed award date.

¹¹⁰ Radio Spectrum Committee, Working document, Draft of a Commission Decision on the 800 MHz band, RSCOM09-59 rev2, 11 December 2009, Article 2(3)

4 Topic 4: Assignment mechanisms

In this section, we first highlight the differences between a licence and a licence-exempt regime. We then present the different licence mechanisms and finally introduce the concept of secondary market.

It should be noted that no new requirements have been added by the 2009 EU Regulatory Framework and that we do not present any recommendations in this section. Instead, relevant assignment mechanisms are recommended under the appropriate topic (Topics 3, 5, 6,7 and 8).

4.1 Licence and licence exempt

There are two main models that can be used to manage spectrum.

- Under the **licence model**, the regulator assigns spectrum to operators through authorisations by using an administrative or a market mechanism.
- Under the **licence-exempt model**, the regulator allows free access to the spectrum, although usually with restrictions (e.g. on power levels), making it most suitable for short-range devices.
 - A licence-exempt approach is used where users are likely to co-exist without interfering with each other and when there is no specific risk of the spectrum needing to be re-allocated to a new use in the future.

Internationally, there is some considerable divergence over the best system to manage spectrum.

- On one side, the main arguments for assigning spectrum under a licence exempt regime is that if all spectrum were set aside for licence exempt use and devices were intelligent, then there would be more than enough spectrum and no further regulation would be needed.
- On the other side, arguments suggest that all spectrum should be licensed, but licence holders should be able to grant access to others, who might not have a licence.

In practice, a combination of these two approaches are generally used in most countries:

- Licence exempt is generally used when equipment conforms to certain conditions such as limits on transmitter power.
- Licence (or authorisation) is generally used in order to ensure that excessive interference is avoided and to maximise the value of the spectrum when demand exceeds supply.

4.2 Licence mechanisms

In Figure 4.1, we present the main mechanisms used to award spectrum, as well as their main advantages and disadvantages.

| <i>Mechanism</i> | <i>Description</i> | <i>Advantages</i> | <i>Disadvantages</i> | <i>Examples</i> |
|-------------------------------------|---|---|--|---|
| Auction | In an auction, the regulator assigns a spectrum licence, and its associated terms of use, to the operator who bids the highest price | Transparency and simplicity Economic efficiency | Collusion is a major concern Letting the market determine industry structure can create competition or pre-emption issues | 2.6GHz licences in Norway and Sweden in 2008 3G licences in most of the European countries |
| Beauty contest | Licence is assigned to those applicants that best fulfil a number of specific criteria These criteria are typically some generic guidelines or indicators (e.g. coverage levels, promotion of services...) against which operators will be ranked according to their commitments | Regulators define the characteristics of the process Beauty contests generally trade economic value for public policy objectives | Consistency between different beauty contest is difficult to achieve Operators might be tempted to overestimate their commitments on the key criteria of the beauty contest Can typically lead to inappropriate valuation of spectrum (and therefore reduce the income for the government or penalise operators in their development if the value of spectrum is too high) | 2G licences in several European countries and 3G licences in France and Ireland |
| Hybrid mechanisms | Licence is assigned following a combination of two mechanisms A beauty contest followed by an auction is the main hybrid mechanism used | Typically combines flexibility for the regulator (in the design of the award) and economy efficiency | Longer process High administrative costs | 3G licences in Hong Kong |
| Lottery | Operators have to fulfil some minimum criteria and licence is assigned at random This mechanism is very rarely used | Simple process Low administrative costs | No guarantee that assignments are made to those parties with the best skills and capabilities to efficiently use the licences | Used in USA to assign spectrum for mobile operators in 1989 |
| 'First come, first served' approach | Spectrum resource is assigned to first applicants This mechanism is very rarely used | Simple process Low administrative costs | No guarantee that assignments are made to those parties with the best skills and capabilities to efficiently use the licences | Generally used for non-commercial services or historically for broadcasting services |

Figure 4.1: Licence award mechanisms [Source: Analysys Mason]

Auctions and beauty contests, which are the main mechanisms used, are described in more detail in the following sections.

4.2.1 Auctions

In this section, we first present the main characteristics of auctions. We then discuss the main auction types that are used to award spectrum, and finally highlight the main objectives and key inputs that need to be taken into account when setting an auction.

Auction characteristics

The design of auctions can typically have the main characteristics described below.

► *Ascending versus final bid auctions*

In an ascending auction, the various bidding parties compete across a number of bidding rounds for the spectrum licence(s) available. At the end of each bidding round a highest bidder will emerge, and a new round commences. This process continues until no new bids are submitted. Ascending auctions utilise increasing monetary bids. Ascending auctions enable a flow of information to be shared between players.

In a final-bid auction, the bidders submit only one single, binding, bid for the spectrum licence. As with the ascending auction, the spectrum licence is then awarded to the party that has made the highest bid. Final bid auctions involve only one bid per bidder. Final bid auctions can only be won by bidding high and can result in the ‘winner’s curse’ i.e. the overestimation of the licence’s value.

► *Open versus closed bidding*

In an open auction, all bidders are provided with most of the information concerning the bids made within an auction.

In a closed auction, bidders are provided with a limited amount of information concerning bids made within an auction. Closed bidding can also be used in conjunction with an ascending auction such that only a limited amount of information is passed between bidding parties, thereby reducing the possibility of collusion.

► *Simultaneous versus sequential auctions*

In a simultaneous auction, all assets are concurrently auctioned. As such, all auctions start and finish at the same time. Simultaneous auctions limit how bidders can respond to other party bids. Simultaneous auctions are more likely to lead operators to bid prices which represent the true value for their activity.

In a sequential auction, each asset is auctioned one at a time, and each new auction commences at the end of the previous auction. Sequential auctioning is not widely used.

► *Individual versus package bidding*

With individual bidding, bidders are allowed to bid for individual licences only.

With package bidding, a bidder can place single ‘all or nothing’ bids for a combination of individual licences. Where package bids are allowed, the winning bids are the set of consistent bids that maximise total revenues. Package bidding is appropriate where the spectrum blocks licensed are complementary. Package bidding has been used by the FCC.

► *First- versus second-price rule*

In both first- and second-price rules the licence is assigned to the highest bidder. In the first-price rule, the highest bidder pays the highest bid (its own bid).

In the second-price rule, the highest bidder pays the second-highest bid. In a second-price rule, the risk of an inefficient outcome is reduced. The outcome would be fair, in the sense that each bidder would be paying as much as necessary to ensure that no other bidder or group of bidders would be happy to pay more.

► *Generic versus specific lots*

Multiple lots can be sold either on a specific or generic basis. With specific lots, bidders place bids for lots at specific frequencies.

By contrast, with generic lots, bidders simply specify the number of lots that they want at a given price per lot, without the lots being associated with particular frequencies. The translation of lots won into actual frequency blocks then takes place in a follow-up process. The use of generic lots is appropriate if, within a given category of lot, the variation in value between lots for bidders is likely to be modest. Use of generic lots is appropriate where bidders are likely to be interested in packages of more than one lot, and where the value of a package has more to do with the characteristics of the package as a whole, rather than the specific frequencies of this package.

Auction types

Each auction type is a combination of several characteristics. The four main forms of auction are presented in Figure 4.2 and discussed afterwards.

| Auction type Main characteristics | Simultaneous multi-round auctions (SMRA) | Sealed-bid auctions | Combinatorial clock auction (CCA) | Combinatorial auctions (package bidding) |
|--------------------------------------|--|---------------------|-----------------------------------|--|
| Ascending | ✓ | | ✓ | ✓ |
| Final bid | | ✓ | | |
| Open | ✓ | | ✓ | ✓ |
| Closed | | ✓ | ✓ | |
| Simultaneous | ✓ | ✓ | ✓ | ✓ |
| Sequential | | | | |
| Individual | ✓ | ✓ | | |
| Package | | | ✓ | ✓ |
| First price | ✓ | ✓ | ✓ | ✓ |
| Second price | ✓ | ✓ | ✓ | ✓ |
| Generic lots | ✓ | ✓ | ✓ | ✓ |
| Specific lots | ✓ | ✓ | ✓ | ✓ |

Figure 4.2: Mapping of main auction types with main characteristics [Source: Analysys Mason]

► *Simultaneous, multi-round auctions (SMRA)*

Description SMRA is the dominant form of spectrum auction. Bidders submit multiple bids in each round for individual lots and can shift their demand between lots over successive rounds, subject to certain rules. The ‘simultaneous clock auction’ is a distinct variant of the SMRA, which is used for selling multiple lots that are considered to be sufficiently similar in value that bidders have no strong preferences between them.

- Examples*
- 3G licences in Germany, UK and Switzerland
 - 3.5GHz in Norway
 - PCS in USA
 - 2.6GHz in Norway and Sweden

► *Sealed-bid auctions*

Description Sealed-bid auctions reduce the flow of information. Limiting the information flow reduces the risk of collusion but increases the likelihood that the value of the spectrum is either under- or over-valued. A bidder can only guarantee success by bidding high. This is in sharp contrast to an open auction where bidding behaviour generally leads the winner to obtain the asset at slightly above the value set by the second-highest bidder.

- Examples*
- 3G licences in Denmark
 - 1781.7MHz in UK (DECT guard band)

► *Combinatorial clock auction (CCA)*

Description CCA requires bidders to make just one package bid each round during a multiple-round process, which is then followed by single round sealed bid. The multiple rounds are intended to allow price discovery, but the final round sealed bid allows bidders the opportunity to express an arbitrarily wide range of preferences over substitute and complement lots. The CCA format is very flexible and can be adapted to cope with any situation where bidders face varying aggregation risks relating to lots either within or across categories.

Examples

- Upcoming 2.6GHz auctions in UK and Netherlands

► *Combinatorial auctions (package bidding)*

Description Combinatorial auctions are used for assigning multiple lots where bidders have synergies between the use of these lots. Bidders can submit bids for both individual lots and for packages of lots, and vary the amounts they bid to reflect any synergies. The winning bidders are determined by calculating the combination of bids across bidders and lots that generates the highest revenue. Package bidding can be implemented in either a single-round sealed bid or multiple round context.

Examples

- 900MHz in Norway
- FWA in Nigeria

Objectives and key inputs

The design of an auction should take into account several objectives and key inputs which are presented below:

Policy objectives

- Provide appropriate incentives for bidders to bid in a manner that leads to efficient outcomes
- Promote competition in downstream markets, thereby fostering growth and innovation
- Speed and cost effectiveness of the auction process
- Fairness and transparency of the auction outcome
- Simplicity and ease of understanding
- Vulnerability of the process to strategic manipulation and collusion

Spectrum availability and technical constraints

Spectrum availability and technical constraints set the parameters for the ways in which spectrum can be packaged and the types of potential usage and should consider the following aspects: type and diversity of technologies and services, amount of spectrum available, number of lots, similarity of lots, geographic area, restrictions on usage, and tradability of lots.

Common value Common value is the value of the lots that are driven by factors that impact on all bidders (e.g. equipment prices, the outlook for the relevant downstream service market, etc.), but are uncertain. In terms of the implications for auction design, it is helpful to consider three questions:

- How important is common value as a proportion of total values?
- How much uncertainty is attached to common values?
- How much information will bidders actually gain from an open auction format?

Substitutability and complementary nature of lots The extent to which different lots are potential substitutes or complements can have very significant implications for auction design. Ideally, auctions should allow bidders to express both their relative preferences for different lots and any increased value associated with buying particular combinations of lots. They should also avoid leaving bidders exposed to winning unwanted lots, which might happen if, say, a bidder bought one lot but failed to win a complementary lot.

Incumbency advantages and bidder asymmetries The existence of known asymmetries between bidders in a spectrum auction can have a big impact on participation and bidder behaviour, and potentially undermine the efficiency of award processes. Asymmetries can be addressed directly by placing restrictions on incumbents (e.g. spectrum caps) or providing incentives to entrants (e.g. bidder credits or reservation of a licence for entrants). An alternative approach is to use auction design to ‘level the playing field’ between weak and strong bidders, and entrants and incumbents by using sealed bids and reduce transparency (i.e. not disclosing number and identity of bidders).

Level of demand and participation problems Unless there are more bidders than licences supplied, licences may simply sell at the reserve price. However, even if there is strong market interest in owning licences, this will not necessarily translate into competition in an auction. Auction designers need to consider two potential threats to entry:

- if there are significant asymmetries between bidders
- bidders may try to reduce the number of their competitors so that the number of bidders is not greater than the number of licences.

There are a variety of techniques that can be used to assist entrants, including reserving licences, promising fee rebates or roaming agreements to winning entrants. However, these measures may distort the efficiency of the auction outcome. Less ‘intrusive’ methods include using a sealed bid rather than open, ascending bid auction or restricting transparency.

4.2.2 Beauty contests

Beauty contests can be characterised by the importance given to the key criteria used to rank bidders. The beauty contest involves three key stages:

- **Design stage**, which includes the identification of key criteria and the level of spectrum fee to be applied.
- **Adjudication stage**, which consists of assessing the operators' business plans and commitments against the selected key criteria and eventually awarding the licence to the highest-ranked operator.
- **Monitoring stage**, which consists of checking that the winning bidders respect their commitments.

Specific issues that are typically more important to deal with in beauty contest in comparison to auctions are:

- managing potential conflicts in the conditions applied to different awards
- ability to apply penalties if commitments are not respected.

The main criteria that are typically used in beauty contests are presented below.

| | |
|--------------------------------|--|
| <i>Economic and Commercial</i> | <ul style="list-style-type: none"> • Commercial launch date • Proposed services • Promotion of competition • Relationship with suppliers |
| <i>Social</i> | <ul style="list-style-type: none"> • Quality of Service • Employment • Relationship with clients • Roaming • Pricing |
| <i>Financial</i> | <ul style="list-style-type: none"> • Licence fees • BP coherence and sustainability |
| <i>Technical</i> | <ul style="list-style-type: none"> • Roll out and coverage • Spectrum efficiency • Impact on the environment |

4.3 Secondary market

In a secondary market, operators will have the ability to trade their spectrum. Spectrum trading is the transfer of spectrum rights between a licensee and one or several parties: users can buy, sell, aggregate and disaggregate spectrum holdings.

The concept of spectrum trading actually refers to the transfer of spectrum usage rights between parties in a secondary market. The actual trade may take a number of forms, including sale, lease or options. There are a number of other features within secondary markets:

- Typically, low frequencies tend to be in highest demand, and based on the high value of this spectrum, it is likely that there will be considerable early interest in trading within these bands.
- Change of ownership and reconfiguration are expected to form the basis of the majority of trades.
- The definition of property rights is relatively straightforward, as spectrum rights are assigned on a national basis and provide exclusive use for a clearly defined set of frequencies.

We present below the main advantages and disadvantages of spectrum trading.

| <i>Advantages</i> | <i>Disadvantages</i> |
|--|---|
| Can play a role in ensuring the efficient assignment and use of the spectrum in some areas | High (and irreducible) transaction costs – welfare gains through more efficient use of spectrum may not be realised if transaction costs inhibit trading Market failure – private gains from trade may be more than offset by welfare losses resulting from market failure (for example, impact on socially valuable services or anti-competitive behaviour) |

Figure 4.3: Main second market advantages and disadvantages [Source: Analysys Mason]

Spectrum transactions can happen through different type of relationships between buyers and sellers. Most spectrum trades are likely to involve simple transfers of licenses from a buyer to a seller. However, there are at least three other possible sets of relationships

- **Many-to-one transactions:** If aggregation of licenses is permitted, it may be possible for one party to conclude a transaction to acquire spectrum holdings from multiple parties
- **One-to-many transactions:** If disaggregation of licenses is permitted, it may be possible for one party to conclude a transaction to transfer its spectrum to two or more parties
- **Intermediaries:** Buyers and sellers could potentially use an intermediary to facilitate their transaction. An intermediary could be a broker that introduces buyers and sellers, an online exchange that brings together multiple parties, or a ‘spectrum bank’ that actively buys spectrum that is underused with the aim of selling it at a profit later.

We present below the adopted approach of spectrum trading in a few countries regarding the types of relationships between buyers and sellers.

| | <i>Australia</i> | <i>Denmark</i> | <i>New Zealand</i> | <i>UK</i> |
|----------------|------------------|----------------|--------------------|-----------|
| One-to-one | ✓ | ✓ | ✓ | ✓ |
| One-to-many | ✓ | X | ✓ | ✓ |
| Many-to-one | ✓ | X | ✓ | ✓ |
| Intermediaries | ✓ | X | ✓ | ✓ |

Figure 4.4: *Types of relationships between buyers and sellers [Source: Analysys Mason]*

There are a variety of ways in which spectrum usage rights could be transferred between parties.

- **Sale:** Transfer of a complete spectrum licence, including all rights and obligations, from a seller to a buyer.
- **Lease:** Transfer of the right to exploit the usage right to another party for a defined period of time, but with ownership remaining with the original rights holder. The original holder of the rights may be able to exercise some control over the leaser.
- **Mortgage/security interest:** Use of the usage right as collateral for a loan, analogous to taking out a mortgage on an apartment or house, or securing a loan with a pledge of assets. Ownership of the usage right is transferred if certain contractually-defined situations occur (e.g. default).
- **Buy-back:** A licence that is sold to another party with an agreement that the seller will buy back the licence at a fixed point in the future
- **Options and futures:** Transactions such as options to buy or sell spectrum under certain contractually-defined conditions (e.g. a right to buy spectrum at a pre-agreed price on a future date). Such arrangements can be complex. Contingent transfers of this type are to be distinguished from purely financial contracts (e.g. derivatives) that may also emerge if there is a secondary market for spectrum; these are financial payments triggered by or related to spectrum prices that can be used to reallocate risks (e.g. resulting from movements in spectrum prices) between contracting parties.

In Figure 4.5, we present the type of transactions allowed in some countries. It should be noted that the information available is only related to the sale, lease and mortgage transaction types and that we do not have information related to the buy-back and options transaction types.

| <i>Spectrum transactions</i> | <i>Australia</i> | <i>Denmark</i> | <i>New Zealand</i> | <i>UK</i> |
|------------------------------|------------------|----------------|--------------------|-----------|
| Sale | ✓ | ✓ | ✓ | ✓ |
| Lease | ✓ | X | ✓ | ✓ |
| Mortgage | X | X | ✓ | X |

Figure 4.5: *Type of transactions [Source: Analysys Mason]*

5 Topic 5: Renewal of 2G authorisations

In this section, we first present the background of 2G authorisations renewal in Belgium, and then detail our recommendations for this topic.

It should be noted that this section focuses on the situation where authorisations are not tacitly renewed. In the event of tacit renewal, we would recommend to follow the process described in Topic 2 (Introduce more flexibility into current authorisation) in order to modify current authorisations.

5.1 Current situation in Belgium

We detail below the Belgian legal framework applicable to 2G authorisations and then present the current plans for authorisations renewal. The current situation is mainly related to re-farming, which is presented as part of Topic 2.

5.1.1 Belgian legal framework applicable to 2G authorisations

The Belgian legal framework applicable to 2G mobile networks is mainly based on:

- the Royal Decree dated 7 March 1995 related to the deployment and exploitation of GSM mobile networks
- the Royal Decree dated 24 October 1997 related to the deployment and exploitation of DCS-1800 mobile networks
- the Royal Decree dated 2 February 2005 modifying the 1995 Royal Decree and the 1997 Royal Decree.

The three 2G authorisations have been initially awarded in Belgium at different dates, for a duration of 15 years. These different award dates are:

- Mobistar : 27 November 1995
- Belgacom Mobile : 2 July 1996
- KPN Orange Belgium¹¹¹ : 2 July 1998.

Belgacom Mobile and Mobistar's initial authorisations were related to the deployment and exploitation of a GSM network in the 900MHz band. In addition, Belgacom Mobile and Mobistar were granted 'complementary authorisations'¹¹² under which they were awarded frequencies in the 1800MHz band in accordance with the Royal Decree dated 25 May 1999, and the Royal Decree of 5 December 2000, respectively. Those two royal decrees specify that operators have to comply

¹¹¹ Authorisation officially granted under the name of Base since 2002.

¹¹² BIPT Council Decision dated 4 July 2003 regarding the award of radio electric frequencies to GSM mobile operators.

with conditions and rules, when applicable, set forth by the Royal Decree of 24 October 1997 related to DCS-1800 networks and by their initial authorisations.

Subsequently, Base was first granted rights of use in the 1800MHz band in accordance with the Ministerial Decree dated 2 July 1998. Base was granted complementary frequencies in the 900MHz band by the BIPT Council Decision dated 4 July 2003, and the Royal Decree dated 2 February 2005, modifying the 1995 Royal Decree related to GSM networks and the 1997 Royal Decree related to DCS-1800 networks. In order to ensure equal treatment, Belgacom Mobile and Mobistar were then granted frequencies in the 1800MHz band so that the three mobile operators would have an equal amount of spectrum in the 900 and 1800MHz bands.

Regarding the status of complementary authorisations granted to Belgacom, Mobistar and Base, we support BIPT's view that 2G operators' complementary authorisations do not constitute new authorisations. Expiry dates of initial authorisations should therefore apply to rights attached to both 900MHz and 1800MHz frequencies.

Regarding the current status of existing 2G authorisations, on 20 July¹¹³ and 22 September 2009,¹¹⁴ the Brussels Court of Appeal quashed the 25 November 2008 BIPT Decision¹¹⁵, with respect to the non-tacit renewal of authorisations of Belgacom Mobile and Mobistar. Belgacom Mobile's authorisation is therefore tacitly renewed until 8 April 2015 and Mobistar's authorisation is tacitly renewed until 27 November 2015. On 24 December 2009, BIPT adopted a decision¹¹⁶ withdrawing its 25 November 2008 Decision that opposed the tacit renewal of Base's 2G authorisation.

The Brussels Court of Appeal confirmed in its 20 July 2009 decision that "each authorisation has its own specific body of rules which differs from the others by its duration and purpose".¹¹⁷ The Court also found that "at the expiration of the current authorisations, no operator will have a vested right to a status quo of its current situation justifying that it could oppose the BIPT will to reorganize the 900MHz band if necessary".¹¹⁸

5.1.2 Current plans for the 2G authorisation renewal

There are three main objectives related to the renewal of 2G authorisations:

¹¹³ Brussels Court of Appeal Decision R.G. N°.2008/AR/3162.

¹¹⁴ Brussels Court of Appeal Decision A.R. N°. 2008/AR/3257.

¹¹⁵ BIPT Council Decision dated 25 November 2008 concerning the opposition to the tacit renewal and exploitation of two GSM networks (Mobistar and Proximus) and the network of the DCS 1800 operator (Base).

¹¹⁶ BIPT Council Decision concerning the withdrawal of the Decision of the BIPT Council of 25 November 2008 concerning the opposition to the tacit renewal of the authorisation for the establishment and exploitation of the network of the DCS1800 operator (Base).

¹¹⁷ Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, § 14, p.9

¹¹⁸ Point 37 of the Brussels Court of Appeal Decision R.G. N°.2008/AR/3162, see p.24

- change conditions of authorisations for existing players (e.g. introduce increased flexibility and technological neutrality within the 900 band)
- provide certainty to existing holders of 2G authorisations as this is crucial for the continuity of their business and would have an impact on investment decisions
- provide 900MHz spectrum for a potential new entrant (by taking some spectrum from existing operators).

In February 2009, BIPT proposed a plan related to the renewal of 2G authorisations, which was consequently approved by the government (we refer to this approach as Plan A).

Plan A would extend the durations of Mobistar and Belgacom Mobile authorisations so that the three authorisations end on 2 July 2013, aligned with Base’s authorisation expiry date. After this date, a number of different options¹¹⁹ are still possible.

- Regarding the 900MHz band
 - If there is a new entrant:
 - the seven blocks of 2x5MHz in the 900MHz band are auctioned
 - a block is reserved for each existing operator and a new entrant and the remaining three blocks are auctioned.
 - If there is not a new entrant
 - the seven blocks of 2x5MHz in the 900MHz band are auctioned
 - a block is reserved for each existing operator and the remaining four blocks are auctioned
 - two blocks are reserved for each existing operator and the remaining block is auctioned.
- Regarding the 1800MHz band BIPT proposed
 - To allocate two blocks of 2x5MHz in the 1800MHz band for low power GSM systems
 - To check if there is a need to reorganise this band prior to 2013 (i.e. during 2009) and if so, this reorganisation includes several options for dividing and assigning blocks of 5MHz or channels of 200kHz
 - If there is a new entrant:
 - the 13 blocks of 2x5MHz in the 1800MHz band are auctioned
 - “X” number of blocks (where x = 1, 2 or 3) are reserved for each existing operator and a new entrant and the remaining “13 – (4 × X)” blocks are auctioned.
 - If there is not a new entrant:
 - The 13 blocks of 2x5MHz in the 1800MHz band are auctioned
 - “X” blocks is reserved for each existing operator and the remaining “13– (3 × X)” blocks are auctioned.

In April 2009, the Federal government suggested an alternative plan (we refer to this approach as

¹¹⁹ BIPT conducted a consultation in February 2009 regarding these different options.

Plan B), which would extend the durations of the three authorisations until 30 June 2030.¹²⁰ Important elements of this plan include:

- A block of 2x5MHz in the 900MHz band is reserved for a potential new entrant and will be attributed in mid-2013. The remaining spectrum will be split between the three existing operators at this date.
- Authorisation prices are indexed on historical prices (taking into account duration and spectrum amount).
- A new fourth-entrant 3G authorisation will end, with other 3G authorisations on 2021, and includes similar obligations to current authorisations.

In December 2009, following Brussels Court of Appeal decisions (July and September 2009) regarding the tacit renewal of Proximus and Mobistar authorisations, the Federal government suggested another plan (we refer to this approach as Plan C), which would further extend the durations of the three authorisations until 15 March 2021. Important elements of this plan include:

- Renewal one-off fees are considered for the tacit renewal period and are equivalent to the historical authorisation price of EUR225 million (taking into account duration and spectrum amount)
- A block of 2x5MHz and 2x10MHz in the 900MHz band is respectively reserved for a potential new entrant and for existing players and will be attributed on 27 November 2015.
- Authorisation prices would be equivalent to the historical authorisation price of EUR223 million (taking into account duration and spectrum amount) and could be paid one off or annually.
- A new fourth-entrant 3G authorisation will end, with other 3G authorisations on 2021, and includes similar obligations to current authorisations.

5.2 Recommendations

This section is structured as follows:

- summary of our main recommendations
- recommendations related to spectrum packaging and timing
- recommendations related to the award process
- recommendations related to spectrum prices
- recommendations related to authorisation conditions.

¹²⁰ A consultation related to Plan B was launched at the end of April 2009.

5.2.1 Summary

Our main recommendations can be summarised as follows:

- Award the 900MHz spectrum as early as possible and award the 1800MHz spectrum at a later date, potentially coupled with the 2.6GHz band (T5-1).
- Extend current 2G authorisations until 2015 and then re-award 900MHz and 1800MHz separately (T5-2).
- Set the price for 2G authorisation renewal until 2015 based on historical prices and calculate the reserve price for 900MHz and 1800MHz spectrum award, depending on supply and demand for this spectrum (T5-3).

These recommendations are detailed in the following sections.

5.2.2 Recommendations related to spectrum packaging and timing

Award the 900MHz spectrum as early as possible

We recommend to give visibility on the award of the 900MHz spectrum as early as possible (i.e. during 2010) to allow operators to have greater certainty over their ‘lower-band spectrum’, which is crucial for network rollout and coverage. It is also highly important for operators to have a long-term visibility of the spectrum they will have access to in order to deploy newer technologies such as UMTS in the 900MHz band.

We also recommend to reserve a 2x5MHz block of 900MHz spectrum for each of the current operators and for a potential new entrant in 2015. The remaining spectrum should be auctioned.

If there is no new entrant, this reserved spectrum should be auctioned between existing operators. The auction price of the remaining blocks will set the price for the reserved spectrum.

We believe reserving spectrum for existing operators is crucial for the continuity of their business:

- GSM technology is not likely to be switched off by 2015. Therefore, existing operators will need to keep their existing 2G networks going
- Although existing operators would likely place the highest value on winning back at least one 2x5MHz block of spectrum each to continue their GSM services, they would not be guaranteed to win. This could expose them to great uncertainty.
- If, unexpectedly, an existing operator failed to win spectrum, there may be significant short-to-medium term disruption to their ability to offer services.

For information, other European regulators such as in AGCOM (Italy) and NPT (Norway) have already decided to reserve some frequencies for existing operators.

Award the 1800MHz spectrum at a later date, potentially coupled with the 2.6GHz band

We believe that the award of the 1800MHz spectrum could be organised later than the award of the 900MHz spectrum band. This is because high-frequency bands (e.g. 1 800MHz) have lower importance than low-frequency bands (e.g. 900MHz) for operators.

It is also worth mentioning that 1800MHz band has been identified as being suitable for deploying 4G/LTE networks. Therefore, we would recommend to auction the 1800MHz spectrum together or with a relatively close timing to the 2.6GHz band. The reorganisation of the 1800MHz band should not be disruptive to operators and operators should not bear an important cost due to the reorganisation of this band.

We also recommend that Belgian authorities give an opportunity to current operators and to the potential new entrant the opportunity to reserve a 2x5MHz block of 1800MHz spectrum prior to the award. The remaining spectrum should be auctioned. If there is not a new entrant, than the reserved spectrum for the new entrant should be auctioned between existing operators. The prices for the reserved spectrum blocks will be set by the auction price of the remaining blocks.

5.2.3 Recommendations related to the award process*Extend current 2G authorisations until 2015 and then re-award award 900MHz and 1800MHz separately*

We recommend a two-phase approach, which is in line with Plan C for the period up to November 2015:

- Base and Belgacom Mobile authorisations to be extended so that the three authorisations end on 27 November 2015, aligned with Mobistar's authorisation expiry date. Timeline is presented in Figure 5.1 below.
- New authorisations to be issued in 2015 for current operators and a potential new entrant with different conditions. We would recommend that new authorisation issued in 2015 to be awarded for a duration of 15 years, in line with current authorisations.

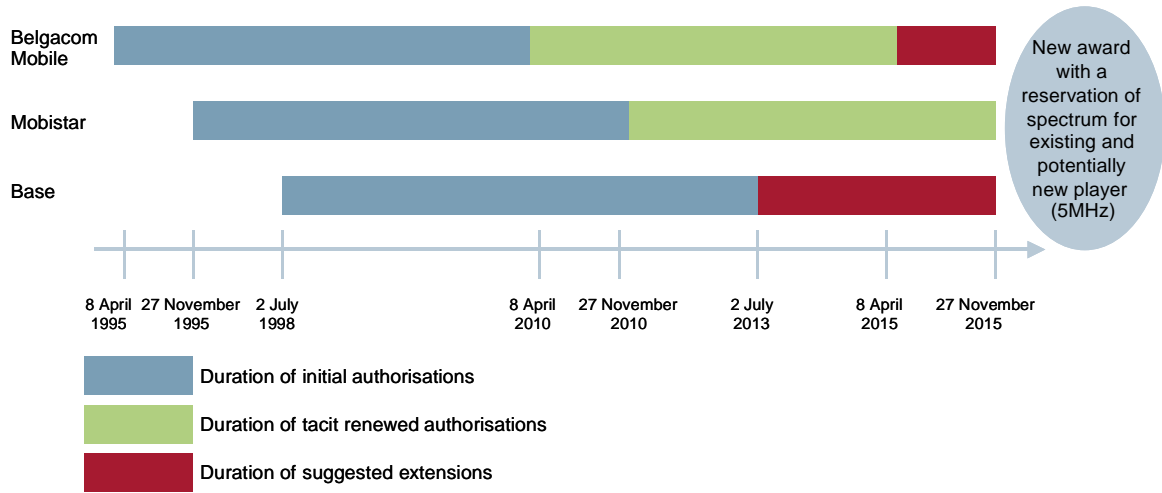


Figure 5.1: 2G authorisations timeline [Source: Analysys Mason]

We would not recommend to follow Plan C after November 2015, as Plan C proposes:

- the ‘automatic’ extension of the duration of 2G authorisations until March 2021; we recommend allowing the market and players decide on the best spectrum allocation between different players
- the continued use of the initial authorisation valuation in 1995 whereas it is not possible to predict that this value corresponds to the real value of spectrum for the next ten years

We recommend to issue new 2G authorisations for the use of spectrum after 2015 for both 900MHz and 1800MHz spectrum due to several factors:

- better use of low frequencies (one block of 900MHz might be enough for coverage perspective)
- easier to change authorisation conditions.

The early introduction of spectrum trading could allow a potential new entrant to acquire spectrum in the 900MHz band before 2015. However, it should be recognised that there is a very low probability that existing operators will sell spectrum in the 900MHz band to a potential new entrant.

It should also be noted that 2G authorisations are usually being extended with a shorter duration than the initial authorisations so that they end on the same date. Some examples of authorisation duration, extension and conditions are provided in Figure 5.2.

| <i>Country</i> | <i>Authorisation duration</i> | <i>Other conditions change</i> |
|----------------|--|---|
| Germany | T-Mobile and Vodafone have been awarded a 19 years licence duration which expires in 2009. E-Plus and O2 have been awarded a nine-year licence duration, which expires in 2012 and 2016, respectively. Three licences were extended in 2007, and all GSM licences are due to expire on 31 December 2016. The regulator proposed extending the amended licences until the end of 2025 | - |
| Ireland | 10 to 15 years so that all licences expire at the same time. Previous licences duration was 15 years | Annual fees should be reviewed in order to take into account the increased value associated with liberalised 900MHz licences |
| Malta | - | MCA mentioned that on account of its value, the spectrum in 900Mhz band cannot be tacitly reassigned following expiry. It is proposed to assess demand via a call for applications and, should demand exceed supply, to award licences through a second stage competitive award process |
| Switzerland | In April 2008, the three licences expiring in May 2008 were extended until no later than 31 December 2013. Previous licence duration was ten years | - |
| France | In 2006, two 2G licences have been renewed for 15 years. Previous licences duration were 15 years | Several changes have been applied on the new licences: - Provision of SMS, GPRS and localisation services included in the minimal set of services - Extension of coverage obligations from 90% to 99% of population from 2007 onwards to cover "white zones" - Introduction of QoS conditions on SMS and data - Allowing the use of UMTS in the 900 and 1800MHz bands - Publishing coverage maps and information - Introduction of annual licence fees of 1% of 2G revenues |
| Netherlands | In 2009, KPN's 2G licence has been extended until 2013, so that all licences expire at the same time. Previous licence duration was 15 years. | Operators paid EUR40 million for this extension |

Figure 5.2: *Examples of renewal of authorisations [Source: Analysys Mason, NRAs]*

5.2.4 Recommendations related to spectrum prices

Set the price for 2G authorisation renewal until 2015 based on historical prices

2G authorisation prices were high in Belgium and sits in the upper range of other European countries, as shown in Figure 5.3.

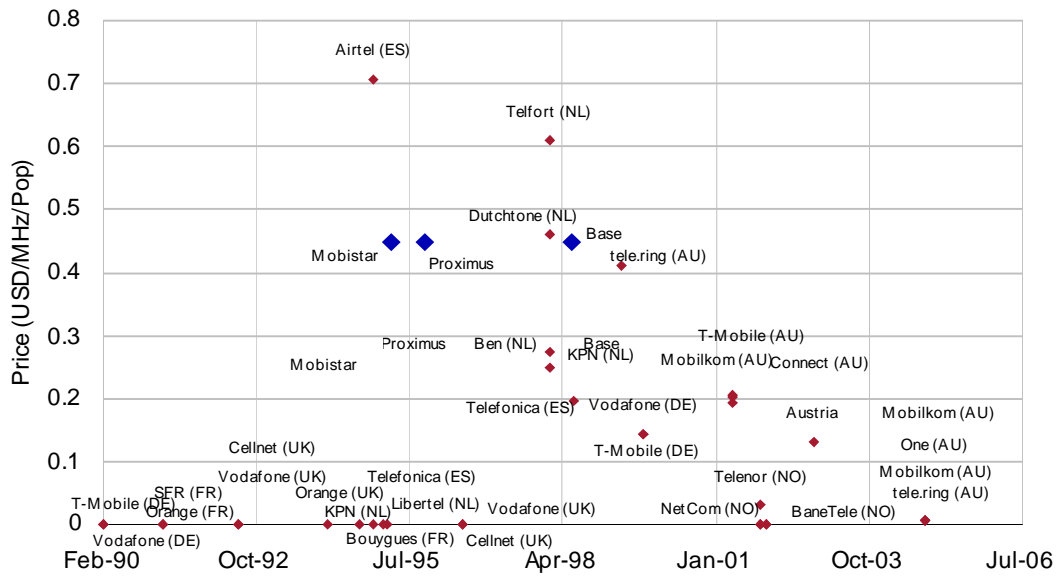


Figure 5.3: Price per MHz per pop for 2G authorisations in Western Europe¹²¹ [Source: Analysys Mason, NRAs]

In Plan C, prices were defined for the period 2010–2021. These prices are based on the characteristics of the initial licence, to which a different duration and spectrum band were applied for each operator .

Therefore the price for 2G authorisation is set at EUR52 083 per MHz and per month (i.e. EUR624 996 per MHz per annum). This would be, for example, equivalent to a price of EUR187.5 million for an authorisation with a 15 years duration and 2×10MHz.

We propose to use the same principles as Plan C to calculate the authorisations prices for the period up to November 2015.

As proposed in Plan C, we suggest to give possibility to operators for differed annual payments, in addition to the standard one-off payment. This differential payment arrangement should be structured to avoid discriminatory claims. To achieve this, a one-time upfront payment should in principle be discounted for the time-value of the payment involved, compared to annual payments that stretch over the life of the right of use¹²². In economic terms, the payments would be the same. Annual payments have already been made possible by European regulators in the past:

¹²¹ We have used the US dollar as an exchange rate as the euro did not exist before 2001.

¹²² Differed payment would therefore take into account an interest rate as compared to the one-off upfront payment.

- In the UK, 50% of the 3G authorisations price could be paid on the sixth, seventh, eighth, ninth and tenth anniversaries of the authorisation with a 8.65% interest rate.
- In Ireland, ComReg suggest that 50% of the price for the renewal of 900MHz and 1800MHz bands to be annualised with a 10.2% interest rate.

Calculate the reserve price for 900MHz and 1800MHz spectrum award depending on supply and demand for this spectrum

As mentioned earlier, we recommend to award the 900MHz and 1800MHz bands after 2015 through an auction instead of applying the same historical prices as suggested by Plan C. We believe that our proposition is relevant as:

- It is difficult to predict a given technology's evolution in the medium to long term and therefore the use and value of the spectrum in these bands can not be assessed.
- The use of market mechanisms is more efficient and would reflect more accurately the true value of the spectrum.

The reserve prices set for authorisation after 2015 should take numerous elements into account. This reserve price should be set to ensure an efficient use of spectrum, by considering the level of supply and demand at the time of the award:

- If demand is likely to exceed supply, then the auction price will result from market players' bids (and the reserve price will not be directly relevant).
- If demand is not likely to exceed supply, then the price paid by the players will be the reserve price and it is in this case very important to define the reserve price as the 'true' value of spectrum for the different players.

In order to determine an appropriate reserve price, the following inputs/methodology should be taken into account:

- Use the historical prices of 2G authorisation auctions in Belgium and in other countries
- Use the 2G reserve prices for GSM900 re-farming in other countries. This information is not yet available.
- Calculate the value of the spectrum use for the likely players (e.g. calculate the NPV of the activity of the players based on the use of awarded spectrum). The value calculated should be the difference between factual and counterfactual scenarios:
 - the **factual** scenario is the use of 900MHz to provide the relevant services for the operator
 - the **counterfactual scenario(s)** would be the best alternative use of spectrum to provide the same service (than in the factual scenario) if the operator would not get 900MHz spectrum . For example, this could include the use of the 2.1GHz band.

Set spectrum annual fees to encourage the effective and efficient use of spectrum while not hampering the development of new services

Under Sections VII of the Royal Decrees of 7 March 1995 related to GSM networks and 24 October 1997 related to DCS-1800 networks, in addition to a one-off price for the grant of 2G authorisations, 2G operators are required to pay annual fees of 1 million Belgian francs per channel of 200KHz duplex for the management and use of frequencies.

Annual spectrum fees, which partly cover usage rights, should be set to encourage the efficient and effective use of spectrum while not hampering directly or indirectly the development of new services. As provided under the EU Regulatory Framework, fees for the rights of use for radio frequencies shall “reflect the need to ensure the optimal use of these resources”.¹²³ The 2002 Authorisation Directive also specifies that such fees “should not hinder the development of innovative services and competition in the market”.¹²⁴ This recital should still be operative, as Article 13 of the Authorisation Directive to which this recital applies is not amended in the 2009 EU Regulatory Framework. Further, the Amended Framework Directive introduces a new Framework Article 8.5 which provides that, in the pursuit of the general policy objectives, NRAs shall safeguard competition and promote efficient investment and innovation in new and enhanced infrastructures.

Therefore, we recommend that annual spectrum fees must be set considering the need to preserve efficient usage of the spectrum while at the same time not hampering the development of innovative services and competition. This approach is supported by A.G. Ruiz-Jarabo Colomer’s opinion in the *Albacom* case¹²⁵, in which the following statement is made in relation to taxes levied for the use of scarce resources provided by Article 11(2) of the Directive 97/13/EC:

“the principle of objectivity, non-discrimination and transparency, and also the Directive’s intention to open the market to all operators and not to impose more restrictions or burdens than strictly necessary, require the rate of the charge and contribution not to be a level, which would discourage the entry of new competitors or the introduction of new telecommunications services”.

Consider imposing renewal fees

Article 13 of the Authorisation Directive provides that “Member States may allow the relevant authority to impose fees for the rights of use of radio frequencies (...) which reflect the need to ensure the optimal use of these resources”.

¹²³ See Article 13 of the Authorisation Directive.

¹²⁴ Recital 32 of the Authorisation Directive.

¹²⁵ Cases C-292/01 and C293/01, *Albacom*, Opinion of A.G. Ruiz-Jarabo Colomer, , §42-43.

The possibility to impose such fees is also provided under Belgian law, in accordance with Article 30 of the 2005 Law on electronic communications. The Federal Authority shall set forth the amount and modalities of such fees.

Under EU law, imposing such fees is subject to several conditions. Article 13 of the Authorisation Directive provides that “Member States shall ensure that such fees shall be objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose and shall take into account the objectives in Article 8 of Directive 2002/21/EC (Framework Directive)”.

As stated in the Communications Committee’s working document on Renewal of 2G rights of use, the European Commission does not exclude the possibility to impose fees for the renewal of 2G rights of use. After citing principles set forth by Article 13 of the Authorisation Directive, the Commission stated that “when deciding the level of fees to be charged for renewed rights of use, Member States should be able to provide a duly explanation of how these requirements are being satisfied”.¹²⁶ The Commission also indicates that “a fee which contains an element calculated by reference to the relevant turnover of the undertaking concerned would in principle not be incompatible with the EU Regulatory Framework”.¹²⁷

As mentioned in 5.1.1 and 5.1.2 above, Belgacom Mobile and Mobistar’s authorisations are tacitly renewed until 8 April 2015 and 27 November 2015 respectively. At the time of the update of this study, the BIPT decided to withdraw the decision refusing to tacitly renew Base’s authorisation.

As also mentioned previously, the government plans to amend Article 30 of the 2005 Electronic Communications Law in order to impose renewal fees for several frequency bands to be listed in the modified Article 30 and in particular the 880-915MHz and 925-960MHz (“GSM 900 Frequencies”), 1710-1785MHz and 1808-1880MHz (“DCS 1800 Frequencies”) and to amend the 7 March 1995 Royal Decree related to GSM networks accordingly. These plans were submitted to public consultation on 18 November and 24 December 2009.

There will be potential risk of legal challenges regarding proposed renewal fees based on the Brussels Court of Appeal decisions dated 20 July and 22 September 2009. However, Belgium Authorities could consider reviewing existing tacitly renewed authorisations on the basis of EU law, and in particular on the basis of the 2009 EU Regulatory Framework, to impose renewal fees.

As mentioned in Topic 2, the 2009 EU Regulatory Framework contains several review provisions that Belgium authorities could rely on to justify a review of the existing authorisations. Belgium authorities could argue that reviewing existing authorisations in order to impose renewal fees is necessary in order to comply with EU requirements, and in particular with the objective to safeguard the efficient use and ensure the effective management of the spectrum, in line with

¹²⁶ European Commission, Communications Committee, Working document on renewal of 2G rights of use, 8 March 2004, COCOM 04-21, §3.4.

¹²⁷ European Commission, Communications Committee, Working document on renewal of 2G rights of use, 23 June 2004, COCOM 04-46, p.4.

Article 17 of the Amended Authorisation Directive and Articles 9.1 of the Amended Framework Directive.

In addition, Belgium authorities could also argue that imposing renewal fees is necessary in order to avoid applying a discriminatory treatment to a potential new entrant which would be required to pay fees for the grant of frequencies whereas existing operators would get their authorisations renewed for five additional years for free.

As a consequence, despite the tacit renewal of the existing 2G authorisations, Belgian authorities could review the existing legal framework applicable to 2G networks and amend Article 30 of the 2005 Law on electronic communications in order to impose renewal fees for the renewed authorisations. These fees would be imposed on operators at the occasion of the renewal of their 2G authorisations and would cover all rights of use for frequencies that were tacitly renewed.

During the process of imposing such renewal fees, Belgian authorities would have to ensure that conditions imposed by EU law are respected.

5.2.5 Recommendations related to authorisation conditions

Remove coverage obligations when issuing new authorisations

Coverage obligations for 2G authorisations have been reached by the current operators. However, if Belgian authorities are concerned that removing coverage obligations reduce operators' incentives to increase or maintain coverage for any specific reason, then coverage obligations may still be applied to these authorisations.

Keep possibility to take back unused spectrum

Both the 1995 Royal Decree related to GSM networks and the 1997 Royal Decree related to DCS-1800 networks¹²⁸ provide for the automatic expiry of the authorisation related to a frequency that has not been used within three years from the date when the authorisation was granted by BIPT. Under the 2009 EU Regulatory Framework, “competent national authorities should have the power to ensure effective use of the spectrum and, where spectrum resources are left unused, to take action to prevent anti-competitive hoarding, which can hinder new market entry”.¹²⁹ In particular, Member States have the possibility to “lay down rules in order to prevent spectrum hoarding in particular by setting out strict deadlines for the effective exploitation of the rights of use by the holder of the rights and by applying penalties, including financial penalties or the withdrawal of the rights of use in case of non-compliance with the deadlines”.¹³⁰ BIPT, therefore, has the legal ability to take back unused spectrum.

¹²⁸ See Article 7§2 of the 1995 Royal Decree related to GSM networks and Article 8§3 of the 1997 Royal Decree related to DCS-1800 networks.

¹²⁹ Recital 71 of the Amended Framework Directive 2009/140/EC.

¹³⁰ New Article 9(7) of the Amended Framework Directive.

In addition, we are not aware of regulators taking back authorisations in the past due to a lack of spectrum use. However, some regulators took back authorisations for other reasons:

- In Italy, IPSE 2000, the fourth winner of the 2000 UMTS auction that was liquidated before launching, was obliged to hand back three 2×5MHz blocks at 2100MHz to the regulator.
- In Denmark, TeliaSonera acquired Orange Denmark in October 2004, and was obliged to hand back Orange's 3G authorisation to the regulator in January 2005.
- In Germany, Mobile 3.0 (a multiplex operator) launched DVB-H as a trial in some major cities but the licence was handed back to the regulator in Oct 2008 as licence obligations were not respected.
- In Netherlands, a licence in the 450MHz band was granted in 2007 to Nozema, which was then acquired by KPN. KPN is currently not using the band and may be asked to return its licence.

There are also examples of operators that handed back their authorisation due to specific issues, as highlighted below

- In Sweden, PTS refused Orange's requests in September 2002 for less stringent coverage obligations and an extension to rollout deadlines for its 3G licence, prompting Orange to announce that it was withdrawing from Sweden altogether. In the fourth quarter of 2004, Orange's concession was revoked at its own request, and returned to the government.
- In Austria, TetraCall Bündelfunk Errichtungs und Betriebs handed back its TETRA licence in the 380–400MHz band that was awarded in 2000.

6 Topic 6: Assessment of frequency assignment to the fourth 3G player

In this section, we first present our assessment of the economic viability of a potential fourth 3G mobile operator in Belgium. We believe that this economic assessment is a prerequisite to understanding relevant award issues. We then present our recommendations regarding the fourth 3G authorisation award.

6.1 Economic viability of a potential fourth 3G operator in Belgium

[Confidential section]

6.2 Recommendations

This section is structured as follows:

- summary of our main recommendations
- recommendations related to spectrum packaging
- recommendations related to the award process and timing
- recommendations related to spectrum prices
- recommendations related to authorisation conditions.

6.2.1 Summary

Our main recommendations can be summarised as follows:

- Reserve a 2x5MHz block in the 2.1GHz band and a 2x5MHz block in lower band frequencies for a potential new mobile operator (T6-1).
- Launch the award mechanism for a 3G authorisation as soon as possible (T6-2)
- Award the fourth 3G authorisation at a price of EUR20 833 per MHz and per month (T6-3)

These recommendations are detailed in the following sections.

6.2.2 Recommendations related to spectrum packaging

Reserve a 2x5MHz block in the 2.1GHz band and a block of 2x5MHz in lower band frequencies for a potential new mobile operator

We recommend that a 2x5MHz block in the 2.1GHz band be reserved for a potential fourth entrant. In addition, the potential fourth entrant should be offered the additional one or two 2x5MHz blocks which are still available in this band. Any remaining blocks should then be auctioned in line with Plan C.

In addition, given the importance of low-frequency spectrum (e.g. 900MHz) for its viability, it is important that a new entrant have the confidence that it would be awarded spectrum in the lower frequency bands as well. Therefore, we recommend to award 900MHz spectrum as soon as possible and to reserve a block of 2x5MHz in this spectrum band (as previously mentioned in Topic 5).

Auction the remaining spectrum in the 2.1GHz band that was not acquired by a new entrant to existing operators and new entrant(s)

We recommend that any remaining spectrum in the 2.1GHz band that is not reserved for and/or acquired by a new entrant be auctioned with a reserved price. Therefore, if the new entrant does not acquire all available spectrum (i.e. 2x15MHz), there would be an auction for the remaining 2x10MHz or 2x5MHz as applicable. If no potential new entrant expresses an interest in acquiring the reserved 2x5MHz block, the entire 2x15MHz block should be auctioned to existing operators.

Assign the fourth TDD block to the new entrant as part of its authorisation in order to avoid a discriminatory treatment

Most European regulators have assigned TDD, coupled with FDD, spectrum equally between operators. Examples of TDD assignment throughout Europe are shown below in Figure 6.1.

| Country | Spectrum per operator (MHz) | Spectrum band (MHz) | Comments |
|-------------|-----------------------------|-------------------------|---|
| Austria | 0, 5 and 10 | 1900–1920 and 2020–2025 | 3 received 5MHz, Mobilkom and T-Mobile received 10MHz each, and Orange did not get any spectrum. FDD and TDD spectrum were auctioned separately |
| Denmark | 5 | 1900–1920 | TDD spectrum assigned to all operators |
| Ireland | 5 | 1905–1920 | TDD spectrum assigned to all operators |
| Luxembourg | 5 | 1900–1915 | TDD spectrum assigned to all operators |
| Netherlands | 5 | 1900–1920 and 2020–2025 | TDD spectrum assigned to all operators |
| France | 5 | 1900–1920 | TDD spectrum assigned to all operators |
| Germany | 0 and 5 | 1905–1920 | Block of 5MHz assigned to three operators. O2 did not get any TDD spectrum |
| Spain | 5 | 1900–1920 | TDD spectrum assigned to all operators |
| Sweden | 5 | 1900–1920 | TDD spectrum assigned to all operators |
| UK | 0 and 5 | 1900–1920 | Block of 5MHz assigned to four operators. Vodafone did not get any TDD spectrum |

Figure 6.1: Award of 2.1GHz TDD spectrum in Europe [Source: Analysys Mason, NRAs]

TDD spectrum was also assigned to existing operators in Belgium. As a result, we recommend to assign the fourth TDD block to the new entrant as part of its authorisation in order to avoid a discriminatory treatment.

6.2.3 Recommendations related to the award process and timing

Launch the award mechanism for a 3G authorisation as soon as possible

Due to the difficulty of building a positive business case for a new entrant, we recommend to award the fourth 3G authorisation as soon as possible in order to gain a clear view on potential (or the lack of) candidates.

Use an SMRA auction

We recommend to use an simultaneous multiple-round auction (SMRA) auction as:

- this type of auction was used for current 3G authorisations in Belgium. We believe that the auction process developed in the Royal Decree of 18 January 2001 for 3G authorisations is appropriate
- this type of auction was mainly used by European NRAs in the past for awarding 3G authorisations.

6.2.4 Recommendations related to spectrum prices

Use the EU-wide latitude let to NRAs

The determination of spectrum blocks prices must comply with EU law principles that give NRAs wide latitude with respect to charging for rights of use.

Article 13 of the Authorisation Directive provides that “Member states may allow the relevant authority to impose fees for the rights of use for radio frequencies which reflect the need to ensure the optimal use of these resources. Member States shall ensure that such fees shall be objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose and shall take into account the objectives in Article 8 of the Framework Directive”.¹³¹

European case law provides elements in order to assess the economic value of frequencies:

- The Court of First Instance recognized that “UMTS licences [...] have an economic value that the manager of that domain is bound to take into account when he determines the amount of fees to be paid by the operators involved”.¹³²
- The Court of Justice also stated that the economic value of the licences shall be determined by taking into account certain criteria and inter-alia:
 - “the size of the different frequency clusters allocated,
 - the time when each of the operators concerned entered the market and

¹³¹ Article 13 was not amended by Amended Framework Directive 2009/140/EC.

¹³² Case T-475/04, *Bouygues v Commission*, Judgement of the Court of First Instance of 4 July 2007, §101.

- the importance of being able to present a full range of mobile telecommunications systems”.¹³³
- The Court of Justice specified that “the economic value of a licence derives, in particular, from the possibility for the licence holder to make use of the rights attached to the licence which, in the present case, means the possibility of occupying public wireless space in order to use UMTS technology”.¹³⁴

Award the fourth 3G authorisation at EUR20 833 per MHz and per month

In line with our suggestion for 2G authorisation price (see Topic 5), we suggest not to index the current 3G authorisation price. We believe that the proposed price of Plan C is reasonable.

In Plan C, the price is based on the characteristics of the initial licence, to which a different duration and spectrum band were applied.

Therefore, we recommend to award the 3G authorisation for EUR20 833 per MHz per month. This represents EUR250 000 per MHz per annum.

In addition, 3G authorisation prices (proposed in Plan C and recommended) in Belgium are within the range of Western European benchmarks, as shown in Figure 6.2.

¹³³ Case C-462/99, *Connect Austria*, Judgement of the Court of Justice of 22 May 2003, §92 and §93.

¹³⁴ Case C-424/07, *Bouygues v Commission*, Judgement of the Court of Justice of 2 April 2007, §119.

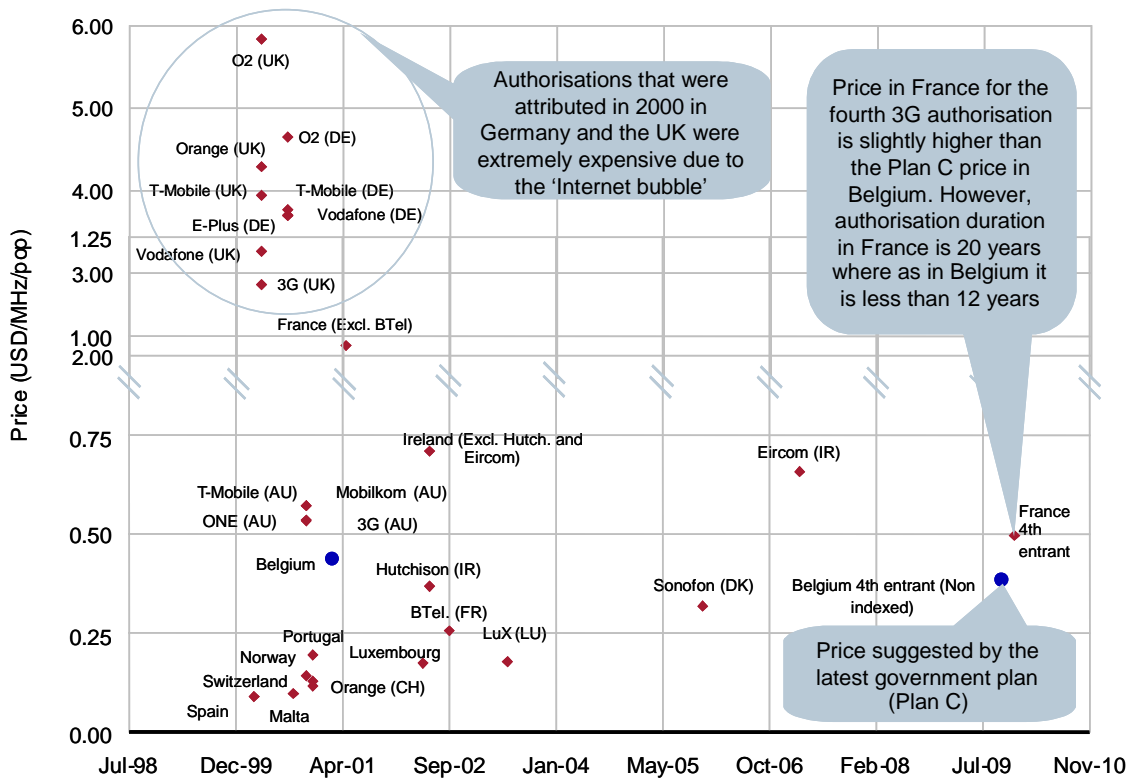


Figure 6.2: Western European 3G authorisations' price benchmarks¹³⁵ [Source: Analysys Mason, NRAs]

6.2.5 Recommendations related to authorisation conditions

Implement spectrum trading

Spectrum trading could allow an existing operator to trade its frequency to the new entrant. However, in practice this is unlikely to happen. (See Topic 4 for more details on spectrum trading.)

Ensure that the new entrant can benefit from national roaming under the most favourable conditions, based on regulatory access conditions if commercial agreement is not reached with an existing operator

As previously mentioned, national roaming conditions are important aspects of the new operator's business case. Therefore, we recommend that Belgian authorities ensure the new entrant can benefit from national roaming in the most favourable conditions.

In order to do so, we would recommend Belgian authorities to adopt a two-step approach:

- Belgian authorities should modify the 2005 Electronic Communications Law and the 18 January 2001 Royal Decree on 3G authorisations to include provisions in compliance with

¹³⁵ We have used the US dollar as an exchange rate as the euro did not exist before 2001.

Article 5.1 of the 2002 Access Directive entitling BIPT to intervene, when appropriate and necessary to ensure end-to-end connectivity and in justified cases in the light of EU regulatory objectives, to impose national roaming obligations on operators that control access to end-users.

- Belgium authorities should ensure that mobile authorisations contain national roaming provisions in compliance with the modified legal framework:
 - New authorisations: Such national roaming provisions should be incorporated in newly granted authorisations, permitting BIPT to impose national roaming conditions if commercial negotiation fails.
 - Existing authorisations: Authorisations should be revised, on the basis of EU law as detailed at Section 2.3.3 of Topic 2, in order to include national roaming provisions in compliance with the new enforceable legal framework.

These recommendations are based on the following analysis of the Belgian legal framework, the EU Regulatory Framework as well as on the analysis of the approaches used in other EU Member States to introduce national roaming.

► *Current Belgium legal framework*

Existing 3G authorisations contain national roaming conditions on the basis of the 18 January 2001 Royal Decree related to 3G authorisations. Article 5 of the 18 January 2001 Royal Decree related to 3G authorisations provides that:

- An operator that is not a 2G operator has a right to conclude a national roaming agreement with a 2G operator that is also a 3G operator.¹³⁶
- A 2G operator that is also a 3G operator is obliged to provide national roaming on its 2G network.¹³⁷
- BIPT can impose national roaming at the request of an operator entitled to national roaming during a period of eight years following the notification of the authorisation of such operator.

¹³⁸

Originally, such provisions were based on Article 89§5 of the Law modifying the status of certain economic public companies dated 21 March 1991, under which the Federal Government had the competence to impose national roaming obligations on operators. This law was modified in 2005

¹³⁶ See Article 5§1 of the Royal Decree related to 3G authorisations.

¹³⁷ See Rapport au Roi for the 18 January 2001 Royal Decree : “Les clients du premier opérateur peuvent accéder au réseau 2G du deuxième opérateur”.

¹³⁸ See Article 5§2 of the Royal Decree related to 3G authorisations.

in order to transpose the 2002 EU Regulatory Framework. Article 89§5 was then abrogated by Article 155. 2° of the 13 June 2005 Electronic Communications Law. Because Article 89§5 is no longer into effect, the 18 January 2001 Royal Decree provisions related to national roaming now lacks legal basis. We understand that national roaming conditions specified in 3G authorisations based on this Royal Decree also are deprived from legal basis. Even if these conditions have not been officially modified or abrogated, a new entrant would face legal uncertainty when claiming a right to national roaming on the basis of these conditions.

We understand that under the 2005 Electronic Communications Law, the Federal Government is no longer entitled to impose national roaming obligations. By virtue of the 2005 law, this obligation can only be imposed by BIPT on operators holding Significant Market Power (SMP) in the context of asymmetric regulation.¹³⁹ This provision may not be totally consistent with the Amended Framework Directive, which in principle gives NRAs discretion, in amended Access Directive Article 5.1, to require access and interconnection. In the meantime, the BIPT Council submitted to public consultation, at the request of the Ministry, a proposal to amend Article 51 of the 2005 Electronic Communications Law entitling BIPT to impose national roaming under certain conditions mentioned below.

► *EU Regulatory Framework*

Under the EU Regulatory Framework, national roaming conditions may be attached to rights of use for frequencies. The Authorisation Directive provides that conditions contained in spectrum authorisations shall honour commitments made by the undertaking obtaining the usage right during the course of the competitive or comparative selection procedure.¹⁴⁰

The EU Regulatory Framework also provides for two different options to impose national roaming obligations.

Option 1: Operators holding SMP

National roaming obligations could be imposed on SMP operators through the regulation of the ex Market 15 “Access and call origination on public mobile telephone networks” of the European Commission 2003 Recommendation on relevant markets. Roaming obligations for SMP operators would be based on Article 12.1(g) of the Access Directive, which provides that “operators may be obliged [...] to provide specific services needed to ensure interoperability of end-to-end services to users, including roaming on mobile networks”.

However, imposing such obligations would be subject to several conditions:

¹³⁹ Article 61§1, 7° belongs to Chapter III of the Law which only applies to SMP operators and refers to Article 55§3 and 4 which relate to relevant market analysis procedure.

¹⁴⁰ See Annex B.7. of the Authorisation Directive. If the current operators made a commitment to comply with national roaming in the course of a competitive or comparative selection procedure for their current authorisation, one could argue that those conditions survive the change in the 2005 Law that deleted the basis for the earlier Royal Decree provision on national roaming.

- Since Market 15 does not belong to the current list of relevant market provided by the European Commission in the 2007 Recommendation, BIPT would have to demonstrate that the Belgium mobile market meet the “3 criteria” test provided by the European Commission in order to identify markets susceptible to *ex ante* regulation:
- An operator or operators holding SMP would have to be identified; and
- When considering whether to impose a national roaming obligation, BIPT would have to take into account several factors listed at Article 12.2 of the Access directive as amended by Directive 2009/140/EC such as the feasibility of providing the access proposed, the initial investment of the facility owner or the need to safeguard competition in the long term.

The Belgium law at Article 61§1, 7° of the 2005 Electronic Communications Law transposes Article 12.1(g) of the Access Directive and would therefore allow the BIPT to apply this approach. However, in the current circumstances of the Belgium mobile market, it might be difficult to pass this test (especially as BIPT already concluded there was no SMP in ex Market 15).¹⁴¹ In addition, other NRA analyses of Market 15 confirm that it is very difficult to identify SMP on this market. As a consequence, this option appears to be limited.

Option 2: Symmetric regulation

The second option would be to impose national roaming through a symmetric regulation based on Article 5.1 of the Access Directive. Under Article 5.1 as amended by Directive 2009/140/EC, NRAs shall “encourage and where appropriate ensure ... adequate access and interconnection, and interoperability of services....” NRAs are required to do so in order to “promote efficiency, sustainable competition, investment and innovation” and to give “maximum benefit to end-users.” This provision enables NRAs to “impose, to the extent it is necessary to ensure end-to-end connectivity, obligations on undertakings that control access to end-users, including in justified cases the obligation to interconnect their networks where it is not already the case”.

BIPT could argue that imposing national roaming in order to ensure infrastructure-based competition for new entrants could be a way to exercise their responsibility in accordance with Article 5.1.

We note, nevertheless, that Article 5.1 should be used with caution, because it is an exception to the Article 16 of the Framework Directive principle that bases *ex ante* regulation on market assessments. It is likely that this authority could only be justified as “appropriate” and “necessary” if commercial negotiations with existing operators fail.¹⁴² BIPT’s room for manoeuvre to impose national roaming obligations under Article 5.1 of the Access Directive would therefore be limited.

¹⁴¹ See BIPT Counsel’s Decision dated 2 May 2007 on Market 15 analysis and Comments from the European Commission dated 23 April 2007 in the case BE/2007/0610: Mobile access and call origination on public mobile telephone networks in Belgium

¹⁴² If commercial negotiations fail, then BIPT could also exercise jurisdiction under Framework Directive Article 20 on dispute resolution between undertakings. This jurisdiction would require one of the parties to request a binding decision.

If Belgian authorities favour symmetric regulation to introduce national roaming, Belgian authorities should ensure that Article 5.1 of the Access Directive is transposed in national law sufficiently to permit imposition of national roaming conditions. BIPT should state in advance that it will apply such conditions if commercial negotiations fail, because it would be legally risky to apply such conditions at the outset with seeking to rely on normal commercial arrangements. BIPT may consider establishing a firm deadline for these negotiations to be concluded.

Moreover, in order to implement such an option, BIPT would have to respect conditions provided at Article 5.3 of the Access Directive as amended by Amended Framework Directive 2009/140/EC. BIPT would have to ensure that national roaming obligations imposed on the basis of Article 5 are:

- objective, transparent, proportionate and non-discriminatory, and;
- implemented in accordance with the consultation and notification procedures provided under Articles 6 and 7 of the Framework Directive. The latter article will normally require that BIPT submit this remedy for Commission consideration. It could be that the process of consulting on this option would give pressure to incumbent operators to provide national roaming through commercial agreement, but the consultation must be held before the remedy is applied.

We note that, in line with our recommendations above, the BIPT Council submitted to public consultation, at the request of the Ministry, a proposal to amend Article 51 of the 2005 Electronic Communications Law entitling BIPT to impose on operators which control access to end-users obligations necessary to ensure end-to-end connectivity, in particular as regards national roaming, in the event commercial negotiations with existing operators fail. The BIPT Council issued this proposal at the request of the Minister for Enterprise and Simplification on 24 December 2009.

► *Approaches used in other EU countries to implement national roaming*

We present below some example of EU countries where national roaming is available. As illustrated by this assessment, in most countries, national roaming have been introduced on the basis of commercial negotiations.

| Country | Approaches used to introduce national roaming | | | Comment |
|---------|---|---|-------|--|
| | Market 15 | Commercial negotiation (with intervention of regulators if negotiation failed) | Other | |
| Cyprus | ✓ | | | Retail minus pricing approach adopted |
| Denmark | | ✓ | | – |
| Finland | ✓ | | | – |
| France | | | ✓ | Common position adopted by the three operators for rural area coverage ¹⁴³ National roaming obligations included in GSM and 3G authorisations ¹⁴⁴ |
| Germany | | ✓ | | – |
| Ireland | | ✓ | | Retail minus pricing approach adopted if regulator has to intervene |
| Italy | | | ✓ | National roaming obligations for 2G and 3G operators to offer national roaming under a fair, non-discriminatory and transparent conditions for a 3G new entrant, for periods of 30–60 months |
| Norway | ✓ | | | – |
| Spain | | ✓ | | – |
| Sweden | | | ✓ | National roaming to be made available by existing operators during the first seven years of the new licence |
| UK | | ✓ | | Retail minus pricing approach adopted if regulator has to intervene |

Figure 6.3: Description of the approach used to introduce national roaming in EU countries [Source: Analysys Mason, NRAs, Operators]

Apply similar coverage obligations to existing 3G authorisations

Similar 3G licence conditions were applied to most of late entrants in Western European countries. To ensure non-discrimination, we would also recommend to apply similar obligations in Belgium by imposing a coverage obligation of 85% of population after six years . This should not impact the viability of the new player since:

- it will need a significant coverage anyway to appear as a credible market player
- it cannot rely on national roaming for a long period due to economic reasons (margins for national roaming are estimated to be lower than 30%).

¹⁴³ <http://www.arcep.fr/fileadmin/reprise/communiqués/2002/cp.pdf>

¹⁴⁴ Such conditions are based on commitments made related to the 3G call for interest process in 2000 and are provided in ARCEP decision 2000-835. Such condition will also be provided in the authorisation of the future 4th 3G licensee.

3G licence conditions for late entrants in Europe are shown below.

| <i>Country</i> | <i>Operator</i> | <i>Late entrants licence award date</i> | <i>Previous 3G licences award dates</i> | <i>Conditions for late entrants</i> |
|----------------|--------------------------------|---|---|---|
| Denmark | Sonofon | Dec-05 | Sep-01 | Same conditions as previous entrants except for licence duration, which was shorter in order to expire at the same time as the other licences (15 years instead of 20 years). In addition, the reserve price was slightly lower (DK430 million instead of DKK500 million). |
| France | Bouygues Telecom | Sep-02 | Jan-01 | Licence conditions were identical to the earlier two applicants and was awarded through a beauty contest. |
| France | Free | Dec-09 | Jan-01 and Sep-02 | Licence conditions were identical to the earlier three applicants and was awarded through a beauty contest. |
| Ireland | Eircom | Mar-07 | 2002 | Licence conditions were identical to the earlier two applicants and was awarded through a beauty contest. H3G received different licence conditions in 2002, mainly related to less-stringent coverage obligations, which explains the price differential between players. |
| Luxembourg | Luxembourg Online and Astralis | Apr-08 | May-02 and Jul-03 | Licence conditions were identical to the earlier three applicants and was awarded through a beauty contest |

Figure 6.4: 3G licence conditions for late entrants in Europe [Source: Analysys Mason, NRAs]

Restrict the new 3G authorisation to IMT2000 family of standards for non-discriminatory reasons

The European Consumer Centre (ECC) responsible for upholding trading standards across Europe is in favour of using IMT2000 for the provision of 3G services. ECC originally decided that the 1900–1980MHz, 2100–2250MHz and 2110–2170MHz frequency bands were designated for terrestrial IMT-2000/UMTS systems. Using IMT-2000/UMTS will also ensure compliance with ITU-R Recommendation M.1457. ECC motivates its decision through the fact that:

- A harmonised implementation of IMT-2000/UMTS will be of greatest benefit to operators, manufacturers and users, and will facilitate the successful introduction of IMT-2000/UMTS across Europe.
- The successful introduction of third-generation services will be facilitated by harmonised use of the IMT-2000/UMTS spectrum across the CEPT.
- There is a growing demand for interoperable mobile voice services and interoperable mobile data services.
- UMTS provides third-generation mobile services, forming part of the International Mobile Telecommunications 2000 (IMT-2000) global family of standards.
- 3GPP completed the initial standardisation of UMTS (release 99) in March 2000

- A harmonised spectrum scheme for IMT-2000/UMTS, taking due account of the protection requirements of IMT-2000/UMTS and other radio services, allows efficient use of the spectrum, particularly in border areas.

In addition, current 3G authorisations in Belgium are restricted to the IMT2000 family. Therefore, we recommend to restrict the new 3G authorisation to IMT2000 family for non-discriminatory reasons. (Such a requirement will be limited by pertinent technical implementing decisions through the RSCoM process that define terrestrial systems that can coexist within the bands.)¹⁴⁵

¹⁴⁵ See Commission Decision 2009/766/EC of 16 October 2009, which in its Annex defines the systems that ensure coexistence.

7 Topic 7: 2.5–2.7GHz band

In this section we first present an overview of the 2.6GHz band regulation and award in Europe, then detail our recommendations relating to the award of the 2.6GHz band in Belgium.

7.1 European situation

Both the EC and the ECC have a range of views on the use of the 2.6GHz band. It is also important to consider the impact of the EC's Wireless Access Policy for Electronic Communications Services (WAPECS) to create more flexible technology licensing conditions.

EC Decision

The European Commission is aiming to harmonise the use of the 2.6GHz band without imposing service or technology restrictions on its use. The Commission's June 2008 Decision on the harmonisation of the 2.6GHz¹⁴⁶ band ("EC Decision") stipulates the following main principles:

- harmonising the conditions for the availability and efficient use of 2500–2690MHz band for terrestrial systems
- designating and subsequently making available by Member States on a non-exclusive basis the 2.6GHz band for terrestrial systems, no later than 6 months after entry into force of this decision (i.e. by 24 December 2008) in compliance with the following parameters:
 - blocks should be assigned in a multiple of 5MHz
 - 2500–2570MHz and 2620–2690MHz assigned for FDD
 - 2570–2620MHz assigned for TDD

In addition, the EC Decision allows for more flexible use, and enables a greater proportion of TDD/unpaired spectrum, if required, based on national requirements. This gives scope to award additional unpaired spectrum for TDD technologies such as WiMAX if such demand exists, as shown in the figure below.

¹⁴⁶ Commission Decision dated June 13, 2008 on the harmonisation of the 2500–2690MHz frequency bands for terrestrial systems capable of providing electronic communications services in the Community (2008/477/EC), OJ L/163, 24 June 2008, p. 37.



Figure 7.1: 2.6GHz band partitioning proposed by the EC [Source: Analysys Mason, EC]

ECC Decision

An earlier ECC Decision (05)05, recommended a ‘fixed’ partitioning of spectrum for FDD and TDD systems in the 2.6GHz band. The band plan proposed in ECC Decision (05)05 is illustrated below, which provides:

- 2 x 70MHz paired spectrum for FDD
- 1 x 50MHz unpaired spectrum for TDD.

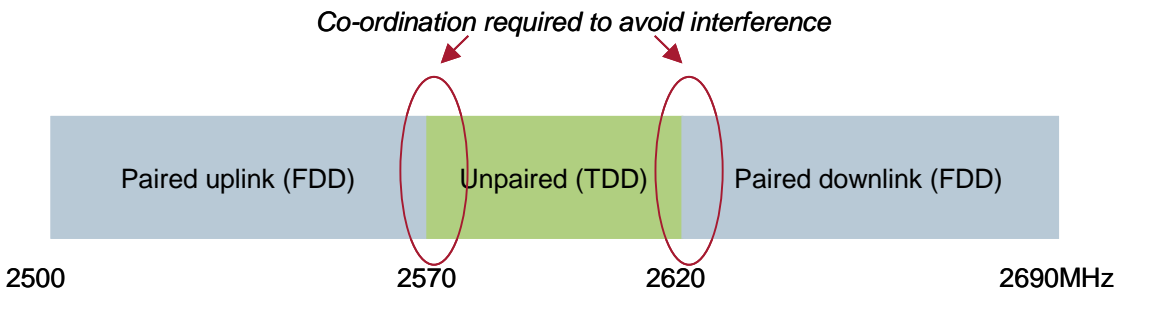


Figure 7.2: 2.6GHz band partitioning proposed by the ECC [Source: Analysys Mason, ECC]

WAPECS

WAPECS is the EC initiative to create more flexible technology licensing conditions. WAPECS is the generic name for the EC’s initiative to develop ‘least restrictive’ technical conditions for frequency bands for use by mobile and wireless broadband services.

One of the EC’s main goals is to achieve a more flexible use of spectrum in Europe, and remove the association between particular spectrum bands and specific technology standards. This initiative moves away from the principles of earlier EC directions, e.g. the GSM Directive, which mandated use of ETSI GSM systems in the 900MHz spectrum in EC member states.

WAPECS technology-neutral principles are implemented through definition of ‘block edge masks’ (BEMs), which are being defined by the CEPT. Rather than specifying out-of-block emissions

based on a specific technology standard, these BEMs are defined in dBm/MHz relative to frequency.

In response to a mandate from the EC, CEPT studied technical conditions for WAPECS in a number of frequency bands, including: 900MHz, 1900MHz, digital dividend, 2.6GHz and 3.5GHz. Initial recommendations have been developed for the 2.6GHz band and contained within CEPT Report 19.¹⁴⁷

For the 2.6GHz band, the CEPT report recommends that:

- To achieve compatibility between FDD and TDD technologies, a 5MHz frequency separation is needed between the edges of spectrum blocks used for TDD and FDD operation.
- Compatibility can be achieved using BEMs defined in CEPT Report 19.

Report 19 also describes the two BEMs that regulators can apply within the 2.6GHz band:

- Unrestricted BEMs, consisting of in-band EIRP limit plus out-of-block emission limits
- Restricted BEMs, consisting of more restrictive in-band limits and out-of-block limits necessary to avoid harmful interference.

Unrestricted BEMs can apply to all channels except those between FDD and TDD blocks (see figure below). Restricted BEMs apply to the 5MHz TDD block adjacent to an FDD block (uplink or downlink).

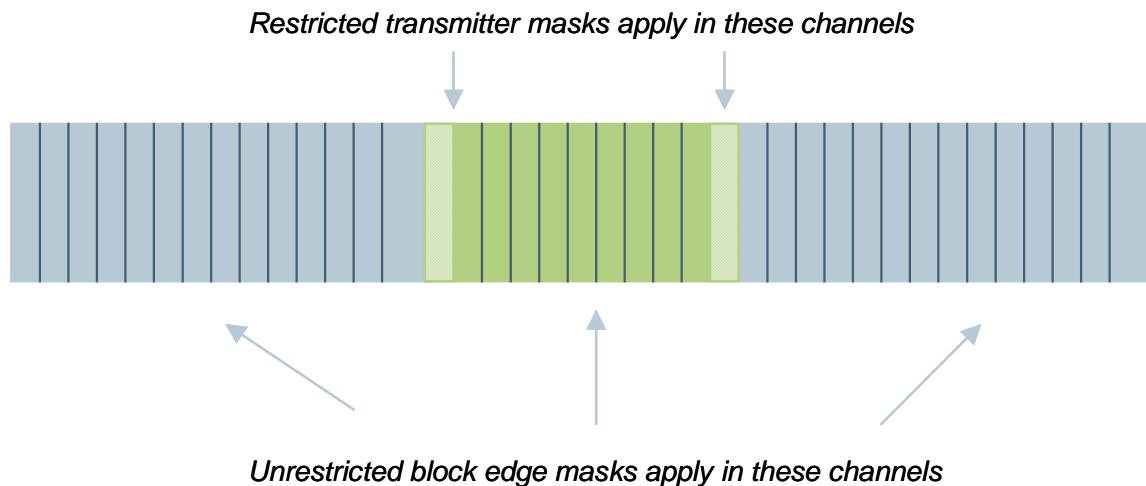


Figure 7.3: BEMs in the 2.6GHz band [Source: Analysys Mason, CEPT Report 19]

The recommended spectrum mask for use in the 2.6 GHz band is detailed in CEPT Report 19 and is presented in the figure below.

¹⁴⁷ Cited above in Section 4.1.2.

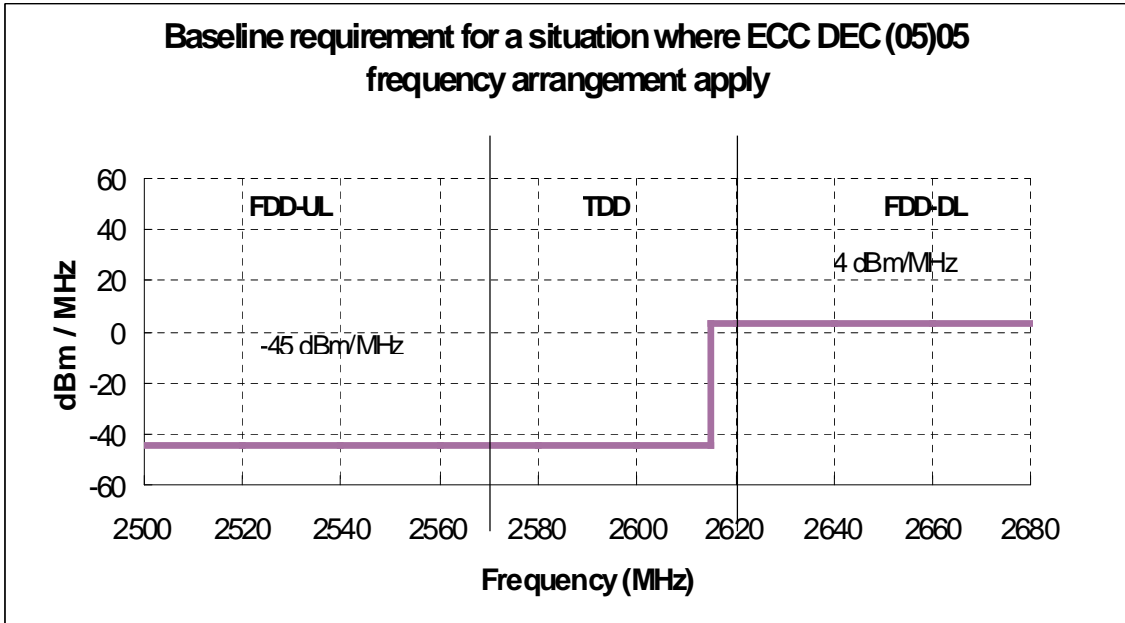


Figure 7.4: Mask for out of block emissions in the 2.6GHz band [Source: Analysys Mason, CEPT Report 19]

For the ‘restricted’ TDD channels, there is a reduced transmitter power limit recommended in CEPT Report 19, as presented in the figure below.

| Channel type | Effective isotropic radiated power (EIRP) in a 5MHz carrier |
|--------------------------------|---|
| Paired (uplink) | 31 dBm/5MHz |
| Paired (downlink) | 61 dBm/5MHz |
| Unpaired (standard uplink) | 31 dBm/5MHz |
| Unpaired (standard downlink) | 61 dBm/5MHz |
| Unpaired (restricted uplink) | 31 dBm/5MHz |
| Unpaired (restricted downlink) | 25 dBm/5MHz |

Figure 7.5: EIRP levels for the 2.6GHz band [Source: Analysys Mason, CEPT Report 19]

7.2 Recommendations

This section is structured as follows:

- Summary of our main recommendations
- Recommendations related to spectrum packaging
- Recommendations related to the award process and timing
- Recommendations related to spectrum prices
- Recommendations related to authorisation conditions

7.2.1 Summary

Our main recommendations can be summarised as follows:

- Assign the spectrum based upon the ‘fixed’ plan of the ECC Decision (i.e. 2500–2570MHz and 2620–2690MHz for FDD and 2570–2620MHz for TDD) (T7-4)
- Wait for a real demand for spectrum before awarding 2.6GHz authorisation (T7-1)
- Award the 2.6GHz spectrum by using a combinatory Clock auction (T7-2)
- Use a lower reserve price than the suggested EUR500 000 per MHz, especially for unpaired spectrum (T7-3)

These recommendations are detailed in the following sections.

7.2.2 Recommendations related to spectrum packaging

Assign the spectrum based upon the ‘fixed’ plan of the ECC Decision (i.e. 2500–2570MHz and 2620–2690MHz for FDD and 2570–2620MHz for TDD)

Spectrum packaging in other European countries is globally consistent with the EC band plan, as shown in the figure below.

| Country | Frequency band | Maximum MHz per operator | Amount of paired spectrum (MHz) | Amount of unpaired spectrum (MHz) |
|-------------|---|---|---|---|
| EC | 2500–2570MHz and 2620–2690MHz for FDD 2570–2620MHz for TDD | - | 140 (14 blocks) | 50 (10 blocks) |
| Sweden | 2500–2570MHz and 2620–2690MHz for FDD 2570–2620MHz for TDD | 140 | 140 (14 blocks) | 50 (10 blocks) |
| Finland | 2500–2570MHz and 2620–2690MHz for FDD 2570–2620MHz for TDD | 50 | 140 (14 blocks) | 50 |
| Norway | Five unpaired blocks of 10MHz (2570MHz to 2620MHz) Eight paired blocks of 2×5MHz (2500–2540MHz paired with 2620–2660MHz) Three unpaired blocks of 10MHz (2540–2570MHz) Three unpaired blocks of 10MHz (2660–2690MHz) | 90 per region | 80 (8 blocks) | 50 (5 blocks) and 60 (6 blocks that could be also used for FDD) |
| Germany | 2500–2570MHz and 2620–2690MHz for FDD 2570–2615MHz for TDD | None | 140 | 50 |
| Netherlands | 2500–2565MHz and 2620–2685MHz for FDD or TDD 2565–2620MHz for TDD | 40 (3G spectrum acquired by existing operators should be deducted from this amount) | 130 (13 blocks that could be also used for TDD) | 50 or 55 (10 or 11 blocks) |
| UK | 2500–2570MHz and 2620–2690MHz for FDD or TDD 2570–2620MHz for TDD | 80MHz paired or 85MHz contiguous unpaired | 140 (14 blocks that could be also used for TDD) | 45 or 50 (9 or 10 blocks) |

Figure 7.6: 2.6GHz spectrum packaging in European countries [Source: Analysys Mason, NRAs]

We understand that there is generally little interest for TDD spectrum in Belgium (and we have not seen any evidence showing specific interest for TDD spectrum in the course of our project). As a result, we would recommend Belgian authorities to proceed with assigning spectrum based upon the ‘fixed’ plan of ECC/Decision/(05)05 (i.e. 2500–2570MHz and 2620–2690MHz for FDD and 2570–2620MHz for TDD).

This assumes the following spectrum split:

- The frequencies from 2500–2570MHz are used for FDD uplink
- The frequencies from 2570–2620MHz are used for TDD
- The frequencies from 2620–2690MHz are used for FDD downlink.

It should however be noted that if BIPT has indication of strong real interest in TDD spectrum, then we suggest to assign the spectrum based on a variable packaging but still with lots consisting

of 5MHz (e.g. Netherlands case). It is important however to realise that this variable split would add a lot of complexity to the award mechanism.

Set a spectrum cap of 75MHz taking into account 2.1GHz and 2.6GHz bands

Plan C suggest a spectrum cap of 40MHz per operator for FDD spectrum. This would allow three operators to acquire FDD spectrum in this band. We recommend initially to set a spectrum cap of 75MHz, regardless of FDD or TDD spectrum, taking into account frequencies in the 2.1GHz and 2.6GHz bands.¹⁴⁸ However, if following operators' requests, there is still some available spectrum in the 2.6GHz band, then the spectrum cap should be increased to ensure that the whole band is awarded.

7.2.3 Recommendations related to the award process and timing

Wait for a real demand for spectrum before awarding 2.6GHz authorisation

Our understanding is that there is currently little or no interest in Belgium for the 2.6GHz spectrum. Therefore, there is no particular benefit to try to award this spectrum too soon if:

- no strong demand for frequencies in the 2.6GHz band is noted
- the band will not be used excessively by existing operators that may just want to pre-empt it.

In addition, if BIPT believes that there is a risk that operators will not use the awarded spectrum, then we would suggest postponing the auction in order not to preclude the potential entry of a new player and to avoid the risk of spectrum hoarding.

If, however, some demand appears, especially from a new entrant, then we recommend the award authorisations as soon as possible.

Regarding the timing of the EC Decision, we note that the deadline of six months appears to be a “soft requirement”, which applies only to “making available” frequencies and not the actual “assignment” of frequencies. Recital 1, which refers to WAPECS flexibility goals (which are presented later in this section), provides that “these policy goals should not be introduced abruptly, but in a gradual manner to avoid disruption of the market”. In addition, Article 2 the EC Decision provides for the possibility for Member States to “request transitional periods that may include radio spectrum sharing arrangements”.

Most other Western European countries are planning the award of 2.6GHz frequencies for either the second half of 2009 or for 2010. However, considering the progress of ongoing auction preparations, auction timelines seem to have a tendency to slip in most countries. The lengthy consultation processes and legal challenges are the result of diverse stakeholder interests, spectrum

¹⁴⁸ The 2.1GHz and 2.6GHz bands have been grouped together in the definition of the spectrum cap as i) they are high frequency bands with similar propagation characteristics, and ii) to avoid that existing operators pre-empt the 2.6GHz band.

characteristics and policy goals. The dates for the auctions planned in Europe are presented in Figure 7.7 below.

| <i>Country</i> | <i>Schedule</i> |
|----------------|--|
| Austria | Q1 2010 |
| Czech Republic | After 2012 |
| Denmark | Delayed from second half of 2009 to Q1 2010 |
| Finland | Completed (December 2009) |
| France | 2010 |
| Germany | Delayed from second half of 2009 to Q2 2010 |
| Greece | Undecided, consultation launched in March 2009 |
| Hungary | Band unusable due to NATO radars |
| Italy | Probably 2010 |
| Ireland | After 2012–2014 |
| Netherlands | Delayed from Q1 2010 to Q2 2010 |
| Norway | Completed (November 2007) |
| Poland | 2010 (tender issued in May 2009) |
| Portugal | Q4 2010 |
| Slovenia | Delayed from 2009 to 2010 |
| Spain | 2010 |
| Sweden | Completed (May 2008) |
| UK | Delayed from Q3 2009 to H2 2010 |

Figure 7.7: Planned auction dates in Europe for the 2.6GHz band [Source: Analysys Mason, NRAs, 2009]

Award the 2.6GHz spectrum by using a combinatory clock auction

We believe the use of an auction with a reasonable reserve price is the most appropriate mechanism for awarding this spectrum. This auction should favour a possible new entrant, and we therefore recommend to reduce barriers to entry for a potential new player by:

- providing good payment terms
- making spectrum tradable.

We would recommend to use a simultaneous, ascending-bid process, and have initially identified three auction types that could be appropriate for this auction :

- **SMRA auction:** This is the auction type developed and used by the FCC (USA) and then adopted by many other regulators. Bidders submit multiple bids in each round for individual specific lots and can shift their demand between lots over successive rounds, subject to certain rules. This auction type was used recently for the 2.6GHz award in Hong Kong.
- **SMRA with augmented switching:** This is a distinct variant of the SMRA auction type, which was used by both Norway and Sweden for their 2.6GHz awards. This auction type allows bidders greater flexibility to switch across substitutable lots than the SMRA, thus reducing aggregation risks for bidders seeking contiguous paired spectrum.

- **Combinatorial clock auction (CCA):** This auction type provides a practical design for package bidding over multiple rounds. The CCA, developed by Ofcom for the UK 10–40GHz, L-band and 2.6GHz awards, and also adopted for the Dutch 2.6GHz auction, eliminates aggregation risks for bidders. This auction type can be used for fixed and variable spectrum packaging.

Overall, among these three options, we would recommend the use of the CCA, as this auction type guarantees contiguous spectrum for bidders. The main advantages are discussed below:

- With package bidding, bidders are not exposed to any aggregation risks, so it is not necessary to have a single lot. Instead, the spectrum could be sold in 5MHz lots, which would leave open the possibility, however unlikely, of having multiple, unpaired entrants. By contrast, under the SMRA, bidders are exposed to winning subsets of their demand or non-contiguous lots. These aggregation risks are only partially alleviated by the SMRA with augmented switching.
- There is little incentive for strategic bidding behaviour that might distort the auction outcome with a CCA auction. In fact, bidders in a CCA generally have very strong incentives to bid their real value. By contrast, it is well known that with the SMRA auction types, there may be significant incentives for deviating from straightforward bidding for strategic reasons, for example, hiding demand by bidding on lots that you do not really want and then switching demand later in the auction.

Do not exclude or award automatically spectrum to existing players

We do not recommend the exclusion of players or the automatic award to certain players due to the low demand for this spectrum band.

7.2.4 Recommendations related to spectrum prices

We recommend to use a lower reserve price than the suggested EUR500 000 per MHz, especially for unpaired spectrum

- ▶ *The suggested reserve price is higher than in other benchmarked countries*

In Belgium, the suggested reserve price is EUR500 000 per MHz for paired and unpaired spectrum. This reserve price appears much higher than in other countries that have already announced the award of 2.6GHz spectrum or awarded this spectrum, especially for the unpaired spectrum (see figures below). For example, in Hong Kong, there was no demand for unpaired spectrum, which had a similar reserve price per MHz to the one suggested by BIPT.

| Country | Reserve price per MHz for paired spectrum (EUR) | Reserve price per MHz for unpaired spectrum (EUR) | Licence duration |
|----------------|---|---|---|
| UK | 12 000 | 12 000 | 20 years |
| Finland | 15 000 | 15 000 | 20 years |
| Sweden | 59 400 | 29 680 | 15 years |
| Germany | 250 000 | 250 000 | Around 15 years (licence ends at 31 Dec 2025) |
| Hong Kong | 499 400 | 499 400 | 15 years |
| Belgium | 500 000 | 500 000 | 15 years |

Figure 7.8: 2.6GHz reserve prices [Source: Analysys Mason, NRAs]

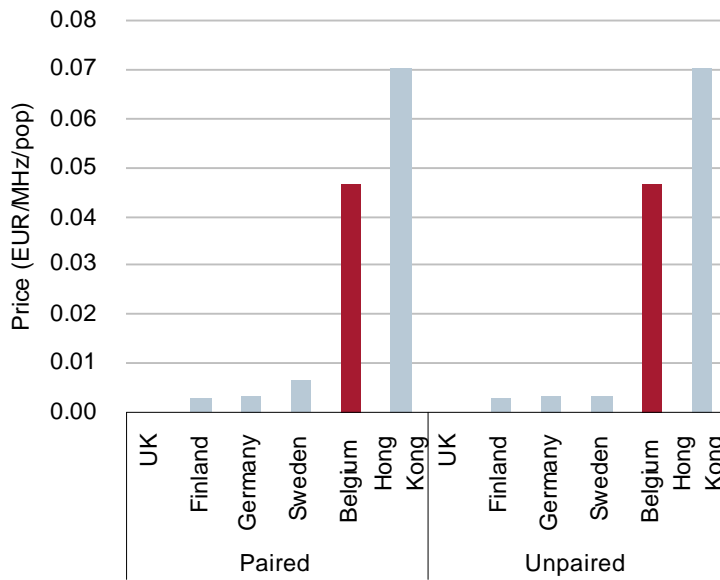


Figure 7.9: Reserve price per MHz, per population [Source: Analysys Mason, NRAs]

In addition, the authorisation includes an annual fee of EUR50 000 per MHz, which is, in general not included in other benchmarked authorisations. As mentioned previously, the determination of spectrum block prices must comply with EU law principles, which we spelled out under Topic 6, mainly by reference to Article 13 of the Authorisation Directive and pertinent European case law. These considerations support wide NRA latitude to set charges, in order to ensure “optimal use” of spectrum resources. The main constraint is that such fees must be “objectively justified, non-discriminatory and proportionate in relation to their intended purpose.”

By contrast to charges for rights of use, NRA administrative charges for either general authorisations or rights of use are subject to tighter limits under Article 12 of the Authorisation Directive.¹⁴⁹ As provided by Article 12 of the Authorisation Directive “any administrative charges

¹⁴⁹ Authorisation Directive Article 12 was not amended by the Amended Framework Directive 2009/140/EC

imposed on undertakings to whom a right of use has been granted shall in total, cover only the administrative costs that will be incurred in the management, control and enforcement of the general authorisation scheme and of rights of use[...]. The Court of Justice confirms that administrative charges shall be cost-orientated and “strictly proportionate to the work involved in implementing licences”.¹⁵⁰

- *The suggested reserved price is higher than the auctioned price for unpaired spectrum in other countries but is lower than the auctioned price for paired spectrum in some countries*

The reserve price in Belgium of EUR0.047 per MHz and per population appears to be high for the unpaired spectrum, as this value was not reached for the unpaired bands in recent auctions, as shown in the following figures. However, the reserve price of EUR0.047 per MHz is lower than the auctioned price for paired spectrum in Sweden and Hong Kong.

| <i>Country</i> | <i>Award date</i> | <i>Paired spectrum (EUR/MHz/pop)</i> | <i>Unpaired spectrum (EUR/MHz/pop)</i> | <i>Paired / unpaired price</i> |
|----------------|-------------------|--|--|------------------------------------|
| Belgium | - | 0.047 (Reserve price) | 0.047 (Reserve price) | 1 |
| Sweden | May-08 | 0.16 | 0.04 | 4.00 |
| Norway | Nov-07 | 0.028 | 0.036 | 0.78 |
| Hong Kong | Jan-09 | 0.24 | - | - |
| Finland | Dec-09 | 0.003 | 0.006 | 0.57 |

Figure 7.10: *Recent 2.6GHz-auction price [Source: Analysys Mason, NRAs]*

¹⁵⁰

Case C-392/04, *Gerrmany GmbH*, Judgement of the Court of Justice of 16 September 2006, §28.

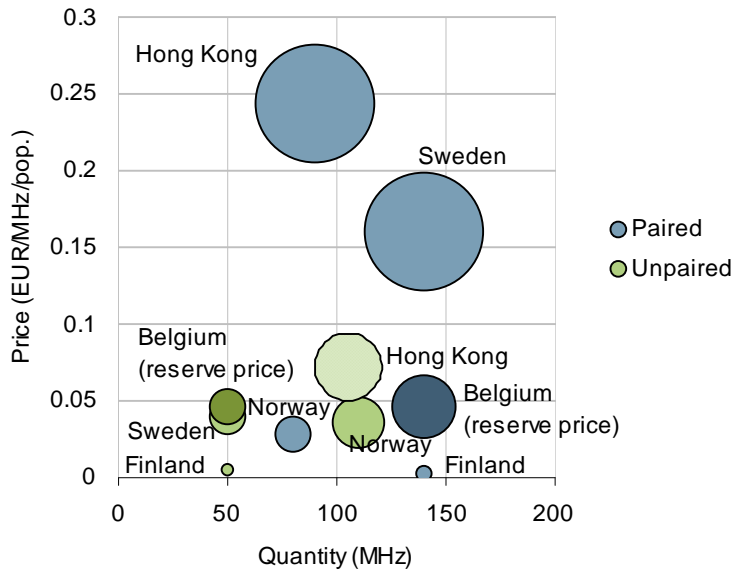


Figure 7.11: Prices per MHz per pop. for 2.6GHz spectrum in recent auctions¹⁵¹ [Source: Analysys Mason, NRAs]

7.2.5 Recommendations related to authorisation conditions

Set the power restrictions consistent with the EC’s 2.6GHz Decision

We recommend that the power restrictions and permissible out-of-block emissions are consistent with the EC’s 2.6GHz Decision and CEPT Report 19.¹⁵²

In addition, the spectrum plan should take into account possible guard bands with adjacent services. Uses of spectrum bands adjacent to the 2.6 GHz band are:

- Wireless LAN, Bluetooth and other short range devices using the band 2400–2483.5MHz
- Mobile satellite services (space-to-Earth direction), using the frequency band 2483.5–2500MHz. This band is currently used by Globalstar, which we note has raised proposals within CEPT for a Complementary Ground component to be operated within this spectrum (similar to proposals now being implemented in the 2GHz MSS allocations)
- Radio astronomy, using the 2690–2700MHz frequency band.

¹⁵¹ Size of spheres corresponds to the prices paid for spectrum licences (in EUR/pop.).

The data point for the Norwegian auction has been corrected to reflect the fact that one of the auction winners secured unpaired spectrum in such a way that it can be used in paired mode.

There was no demand for unpaired spectrum in the Hong Kong auction given its reserve price of EUR0.07/MHz/pop. This data point therefore represents a possible upper limit of actual market demand and price.

¹⁵² Report from CEPT to the European Commission in response to the Mandate to develop less restrictive technical conditions for frequency bands addressed in the context of WAPECS, Report approved on 21 December 2007 with editorial revisions on 17 March 2008 and 30 October 2008 (CEPT Report 19).

Based on discussion with BIPT we understand that there are no radio astronomy sites operating in this frequency band in Belgium. However, we are aware that there are sites operating in the Netherlands, and note that emissions from mobile network base stations in Belgium may be sufficient to interfere with radio astronomy heights in the Netherlands, as a result of the sensitive nature of radio astronomy sites.

To validate this, we have undertaken an initial high-level analysis of the potential for interference, using an RF planning tool.¹⁵³ The objective of this modelling was to assess at a high level whether the Dutch Radio Astronomy observatories will cause any restrictions for Belgian mobile use of 2500–2690MHz.

Our analysis suggests that there is indeed an impact on the Dutch radio astronomy sites from mobile networks in Belgium operating in the 2.6GHz band. This may need to be considered further by BIPT when issuing authorisation conditions for the use of the 2.6GHz band.

Our analysis was carried out to predict the sum of interference of the mobile sites in Belgium at each radio telescope using a reference network of mobile base station transmitters located uniformly across the country. We have considered the impact of transmission from mobile base stations operating in the topmost channels within the 2.6GHz band in Belgium, as indicated in Figure 7.12, below.

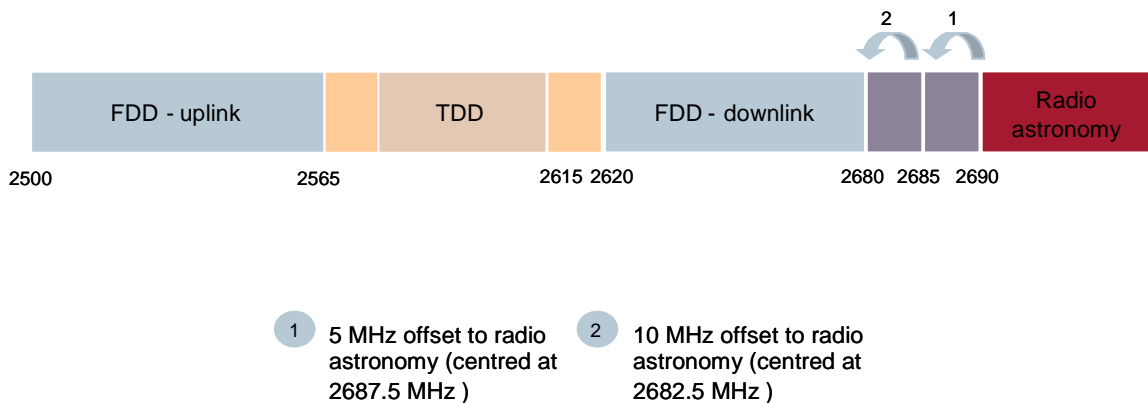


Figure 7.12: Frequency offsets investigated within radio astronomy analysis [Source: Analysys Mason]

We understand that there are two radio telescopes in the Netherlands. These radio telescopes are:

- Westerbork Synthesis Radio Telescope (WSRT) near Midden-Drenthe
- Dwingeloo Radio Observatory in Dwingeloo near Lhee.

It is believed that Dwingeloo is no longer in use, but work is underway to restore the telescope to working order.

¹⁵³ We have used the ATDI ICS Telecom planning tool for this analysis.



Figure 7.13: Radio telescopes in the Netherlands [Source: ASTRON]

We have illustrated the location of the two telescopes in the figure below.

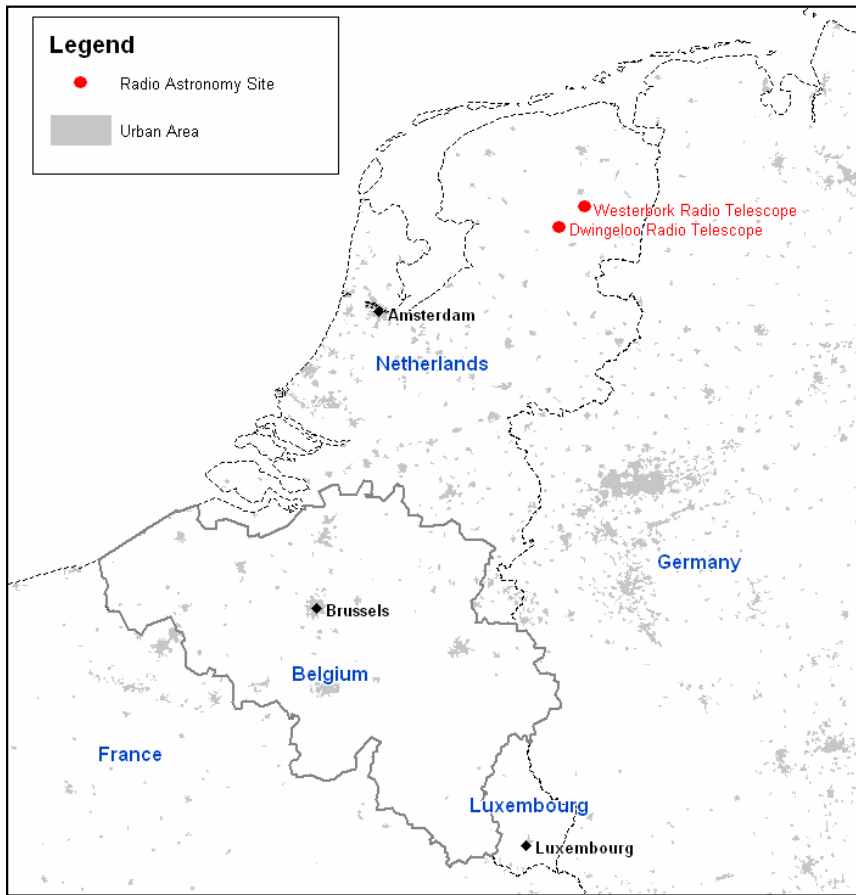


Figure 7.14: Radio Telescopes in the Netherlands [Source: Analysys Mason]

The inputs used and the results of our analysis are detailed in Annex B.

Award the 2.6GHz band on a technology-neutral basis

We recommend to follow the EC decision and to award the 2.6GHz band on a technology-neutral basis.

Do not impose any coverage obligations

For the 2.6 GHz band, we do not recommend having any coverage and rollout obligations for new authorisation. This approach is also consistent with most European countries, which, as illustrated in Figure 7.15, below, have very lenient obligations.

| <i>Country</i> | <i>Automatic assignment or exclusion of certain players</i> | <i>Licence obligations</i> | <i>Licence duration</i> |
|----------------|---|--|--|
| Sweden | No | No coverage or roll-out obligations | 15 years |
| Finland | No | No coverage or roll-out obligations | 20 years |
| Norway | No | No coverage or roll-out obligations | 15 years |
| Germany | No | Coverage obligations - 25% of population at 1 January 2013 - 50% of population at 1 January 2015 | Around 15 years (licence ends at 31 Dec 2025) |
| Netherlands | No | Very limited roll-out obligations: roll out in a an area of 20km ² within 2 years | 20 years |
| UK | No | No coverage or roll-out obligations Minimum conditions to ensure: - effective use of the licensed frequencies by controlling interference between different authorised uses - compliance with international and legal requirement | 20 years |

Figure 7.15: *Licence obligations for 2.6GHz band in European countries [Source: Analysys Mason, NRAs]*

8 Topic 8: Low power/private/local GSM systems in the 1800MHz band

In this section, we first present the European situation related to local GSM networks in the 1800MHz band. We then detail our recommendations related to this topic.

8.1 European situation

Very few European countries have already assigned spectrum to local GSM networks in the 1800Mhz band. We have only identified two countries (UK and Netherlands) that have been active in this area.

The main characteristics of the award design and authorisation conditions are presented in Figure 8.1.

| | <i>Mechanism type</i> | <i>Number of authorisations awarded</i> | <i>Reserve price</i> | <i>Authorisation date of issue and duration</i> | <i>Licence tradability</i> | <i>Access rights</i> |
|-------------|--|--|----------------------|--|----------------------------|---|
| UK | Auction (Single bid, sealed round) | 10 ¹⁵⁴ (Four operators launched their services) | GBP50 000 | Issued in 2006 for an indefinite duration | Allowed | Concurrent access (i.e. All licensees use the same frequencies on a shared basis, with no licensee having priority) |
| Netherlands | Licence exempt (Notification to regulator only required) | 2 companies that deployed around 100 Base stations | Not applicable | Issued in 2008 until 25 February 2013 ¹⁵⁵ | Not applicable | Concurrent access |

Figure 8.1: Licence terms and attribution mechanism design [Source: Ofcom, Dutch Radiocommunications Agency]

The main characteristics related to the technical conditions are presented in the figure below.

¹⁵⁴ Ofcom indicated it would like to award ‘between five and ten’ authorisations. The actual number of authorisations awarded as a result of the auction was ten.

¹⁵⁵ GSM licences are valid until 25 February 2013. The attribution of the entire GSM1800 band after this date is to be reconsidered.

| | <i>Spectrum</i> | <i>Maximum power limit</i> | <i>Out-of-block emissions</i> | <i>Maximum height of transmitter</i> |
|-------------|--|---|--|--------------------------------------|
| UK | 1781.7–1785MHz paired with 1876.7–1880MHz (2 x 3.3MHz) | 23dBm/ carrier EIRP | Based on spectrum mask for GSM contained in ETSI GSM specification | 10 metres |
| Netherlands | 1782.5–1785MHz paired with 1877.5–1879.9MHz (2 x 2.5MHz) | 200 mW (equivalent to 23 dBm/ carrier EIRP) | Based on spectrum mask for GSM contained in ETSI GSM specification | - |

Figure 8.2: Technical conditions [Source: Ofcom, OPTA]

As presented in the figure below, few operators mention that they have started to offer services in the UK since authorisations were issued in 2006. It should be noted that we have not been able to find comparable information for the Netherlands.

| <i>Licence holder</i> | <i>Status</i> |
|--------------------------|--|
| BT | BT Fusion FMC uses Wi-Fi and UMA solution for in-house coverage and are not yet using the spectrum within the DECT guard band. However, BT announced recently trial with OnRelay to deliver GSM-based solutions, to add to BT corporate fusion portfolio |
| Colt | No information available |
| Cable and Wireless | Fixed Mobile Convergence (FMC) product launched using C&W branded SIM; uses Ericsson GSM pico-cells; national roaming agreement in place with Orange |
| FMS Solutions | Offers ‘corporate GSM gateway’ systems |
| Mapesbury Communications | Now trading as UK01 – initial trial service underway |
| Opal | Fully owned by The Carphone Warehouse – not yet launched low power GSM systems |
| PLDT (UK) Limited | Not yet launched low power GSM service in the UK |
| Shyam Telecom | Has formed partnership agreement with Cellular Asset Management for launch of services in the UK, but currently not offering low power GSM |
| Spring Mobil AB | Not yet launched low power GSM service in the UK |
| Teleware PLC | Trades as Private Mobile Networks, offering low power GSM systems to enterprise and construction companies |

Figure 8.3: Status of local GSM networks in the UK [Source: Ofcom, operators’ websites, Analysys Mason]

8.2 Recommendations

This section summarises, and then describes our main recommendations for local GSM networks in the 1800MHz band.

8.2.1 Summary

Our main recommendations are:

- Use the DECT guard band for local GSM networks (T8-1)
- Make available the spectrum using a licence exempt regime (T8-2)

These main recommendations are detailed in the following section. Other important elements, such as elements related to technical conditions, are also discussed below.

8.2.2 Description of recommendations

Use the DECT guard band for local GSM networks

The use of DECT guard band is appropriate, and has been used in other countries such as the UK and the Netherlands. The DECT guard band was originally designated as 2 x 5MHz 1780–1785MHz paired with 1875–1880MHz, which can provide 25 channels for concurrent low power use.

Our view is that the bandwidth available in the DECT guard band gives sufficient frequencies for low power GSM systems, assuming licensees have concurrent rights (e.g. shared access to the available resource).

Note: The 1780–1785MHz band paired with 1875–1880MHz (DECT guard band) is currently assigned to Base. In order to allocate this band to local GSM networks, a procedure should be put in place in order to free this band.

Make available the spectrum using a licence exempt regime

We understand from the result of BIPT's public consultation that there is low demand for low-power GSM systems in Belgium. We would therefore recommend to award the spectrum under a licence-exempt regime and aim to put the award mechanism in place by 2010. This approach would:

- make this spectrum available for any operator in the short term (which could ease the market entry of a new mobile player)
- ensure this spectrum is not pre-empted by a specific user
- allow players to come up with innovative plans in the future (for uses currently not considered).

However, we would recommend to specify three main conditions for the use of this spectrum :

- BIPT should be able to stop the availability of spectrum for this service with two years' notice, in case there is a decision to use this spectrum for another purpose
- users must notify BIPT of site location
- users must comply with some technical requirements in order to avoid interferences with other networks (as specified in Section 10.2.4, below).

It should be noted that the ability to set up favourable wholesale agreements with mobile operators is crucial to users of these systems, and BIPT must ensure that a transparent and efficient process is set in place.

Define specific technical conditions for the use of local GSM networks

We suggest the following technical conditions are defined for the use of local GSM networks:

- Operators should be asked to develop a Code of Practice for co-ordination between systems
- A maximum power limit of 23dBm/carrier EIRP is reasonable
- Out-of-block emissions should be based on spectrum mask for GSM contained in ETSI GSM specification.

Although each operator is granted nationwide access, in practice, systems can only be deployed locally as a result of the low power restriction. There is also not enough spectrum available to provide sufficient coverage to operate a regional or a national network, and so services are limited to pico-cellular coverage. Therefore, the risk of interference is limited.

9 Topic 9: Microwave links

In this section, we first present the current tariff structure and level in Belgium, and then present our recommendations.

9.1 Current tariff structure and level in Belgium

Microwave links are governed by the 18 December 2009 Royal Decree related to private wireless access communications and rights for the use of fixed networks and shared resources networks. Chapter 5 and Annex 1 of the Royal Decree set forth provisions regarding fees. BIPT microwave tariff structure is in line with most European countries, as presented in the figure below:

| <i>Country</i> | <i>Availability of different structures</i> | <i>Fixed fee per link (no parameters taken into account)</i> | <i>Fees based on spectrum blocks</i> | <i>Fees based on links</i> |
|----------------|---|--|--------------------------------------|----------------------------|
| Belgium | | | | ✓ |
| France | ✓ | | ✓ | ✓ |
| Germany | | | | ✓ |
| Italy | | | | ✓ |
| Netherlands | | | | ✓ |
| UK | ✓ | | ✓ | ✓ |
| Finland | | ✓ | | |
| Norway | | | | ✓ |
| Sweden | | | | ✓ |

Figure 9.1: Comparison of microwave link tariff structure in European countries [Source: Analysys Mason, NRAs, ETNO 2009]

The tariff parameters taken into account in each country are presented in Figure 9.2.

| Country | Frequency band | Amount of spectrum (bandwidth) | Bit rate | Area (km ²) | Geographic location (Congestion areas) | Discount in relation to number of links |
|-------------|----------------|--------------------------------|----------|-------------------------|--|---|
| Belgium | ✓ | ✓ | | | | |
| France | ✓ | ✓ | | ✓ | | |
| Germany | ✓ | ✓ | | | | |
| Italy | ✓ | ✓ | | | | ✓ |
| Netherlands | ✓ | ✓ | | | | |
| UK | ✓ | ✓ | ✓ | | ✓ | |
| Finland | | | | | | |
| Norway | ✓ | ✓ | | | | |
| Sweden | ✓ | | | | | |

Figure 9.2: Comparison of microwave links tariff parameters in European countries [Source: Analysys Mason, NRAs, ETNO]

In Figure 9.3, Belgian prices are compared to other European countries for standard frequency bands and bandwidths. As illustrated below, Belgian prices appear to be significantly higher than the other benchmarked countries.

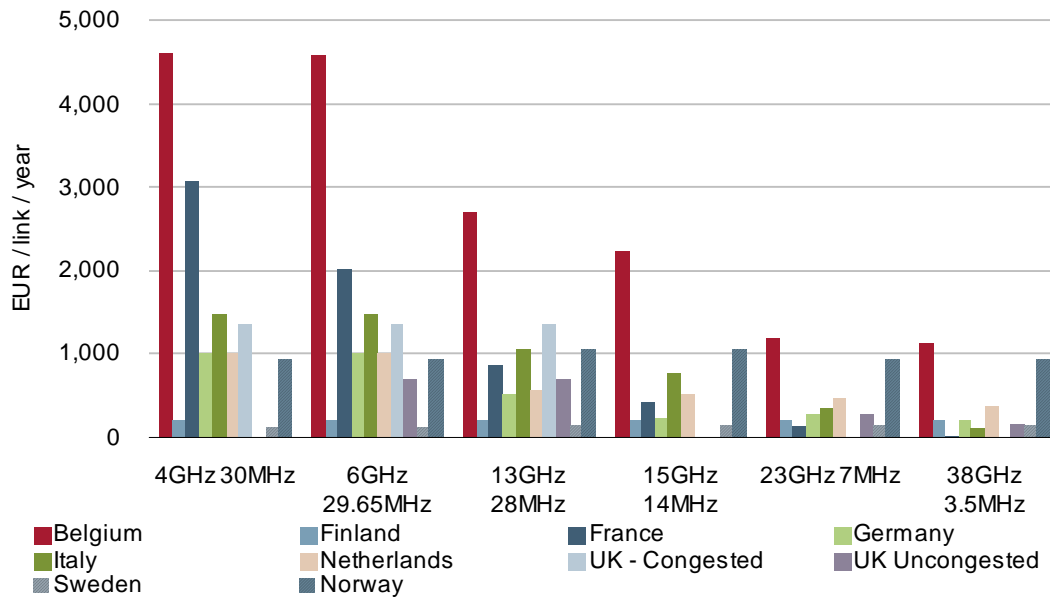


Figure 9.3: Comparison of microwave links tariffs in European countries in 2009¹⁵⁶ [Source: Analysys Mason]

¹⁵⁶ Calculations based on three-year service life for Italy and Netherlands, on links structure in France (which is more expensive compared to spectrum block structure) and in the UK, and on usage of over 80 links.

9.2 Recommendations

We recommend a significant reduction of microwave link prices in Belgium (T9-1). As an example, we provide below a comparison of the current tariffs in Belgium with tariffs reduction of 50% and 75% with the minimum, maximum and average tariffs in other European countries in Figure 9.4.

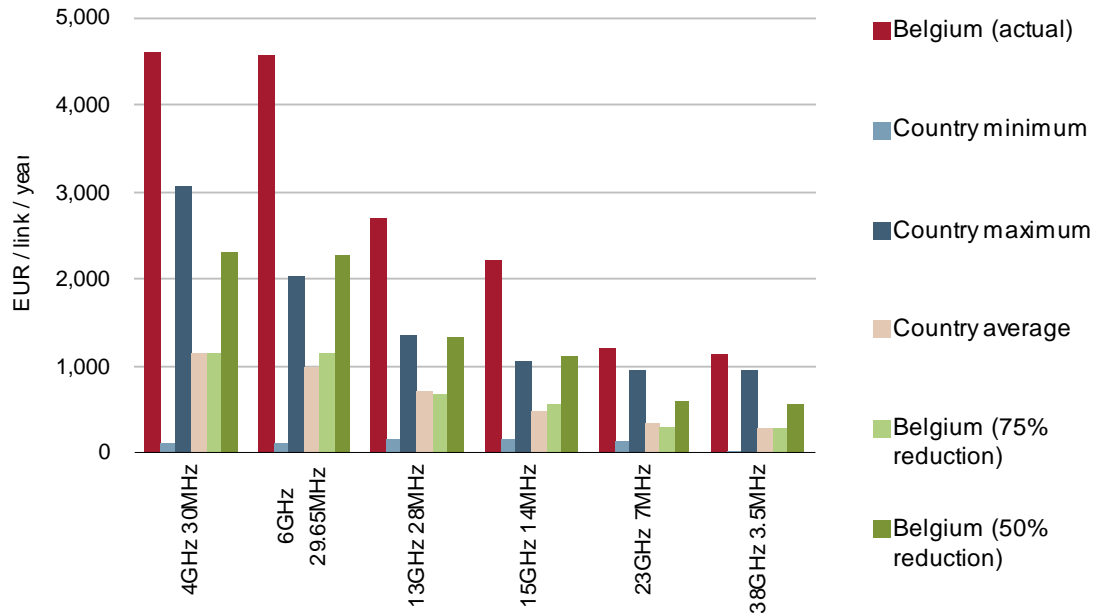


Figure 9.4: Comparison of microwave links tariffs in European countries with our recommendations [Source: Analysys Mason]

As mentioned previously in Topic 1, microwave links tariffs impact mainly pure mobile operators and late entrants (e.g. Mobistar and Base) as these operators do not have a national fixed infrastructure.

The reduction of microwave links tariffs could either directly benefit to players (as they will pay less for comparable bandwidth) or indirectly by adding competitive pressure on leased lines tariffs.

For example, in the UK BT reduced its leased-line prices following falls in the tariffs for microwave links; Vodafone consequently continued to use leased lines rather than transferring to microwave links.

10 Conclusion

In this section, we first present the consistency and timing of our recommendations for each of the topics, then discuss the likely impact and anticipated difficulty of implementing our main recommendations.

10.1 Timing of recommendations

Timing for the main spectrum awards is outlined below.

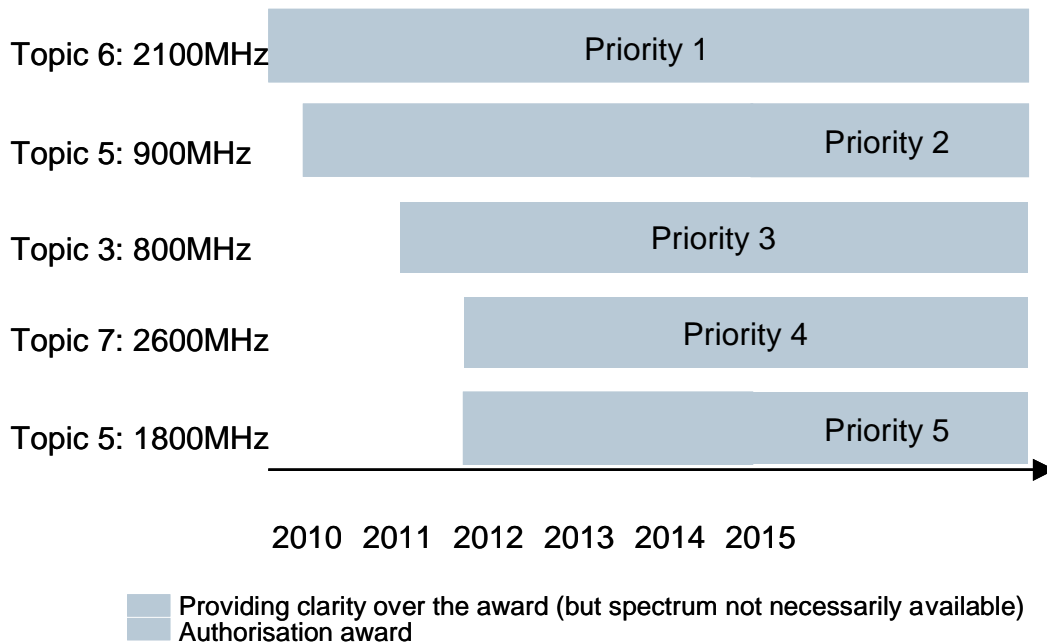


Figure 10.1: Proposed timing for different awards [Source: Analysys Mason]

- Priority 1* Award the remaining 2.1GHz spectrum band as soon as possible (i.e. in the first half of 2010) in order to identify if there will be a potential fourth entrant in the market.

There should also be clear communication related to spectrum reservation of lower-band blocks (i.e. 900MHz) for a potential new entrant.
- Priority 2* Provide clarity (in 2010) over the award of the 900MHz spectrum (even though this spectrum might not become available before 2015) .
- Priority 3* Award the digital dividend spectrum during 2010–2011, after providing clarity over the award of the 900MHz spectrum .

This would allow operators to have greater certainty over their ‘lower-band spectrum’, which is crucial for network rollout and coverage.
- Priority 4* Award the 2.6GHz spectrum band between 2011 and 2012, as there is currently no real demand for this spectrum.
- Priority 5* Provide clarity over the award of the 1800MHz spectrum band as close as possible to the award of the 2.6GHz spectrum band and award the 1800MHz spectrum in 2015 as:

 - These bands have been identified as being suitable for deploying

4G/LTE networks.

- This will give operators time to assess additional spectrum required for additional capacity above that which they already own in the low-frequency spectrum bands

We have studied other possible alternatives, which we present in the figure below.

| <i>Scenario</i> | <i>Timing</i> | <i>Advantage / Reason</i> | <i>Disadvantage / Issue</i> |
|---|---------------|--|--|
| Bundling of 2.1GHz and 900MHz | 2010 | Having spectrum in lower bands gives greater confidence to a new entrant | Delay in awarding spectrum to a new entrant as setting up the award of 900MHz band could take some time due to several legal and technical challenges |
| Award of TDD in the 2.6GHz earlier than the FDD | 2010 | Encourage entry of new WiMAX operators and therefore increasing market competitiveness | No clear indication of potential interest from WiMAX operators at this date |
| Delay the award of 2.1GHz | 2010-2011 | Current economic conditions are not ideal for spectrum award and especially for a new player | Getting a clear view on the entry of a new operator is key for the market. Delay in market entry for a new operator would make even harder its business case |
| Bundling of 2.1GHz and 800MHz | 2010 | Gives more confidence to a new entrant of having spectrum in lower bands | Delay in awarding spectrum to a new entrant as setting up the award of 800MHz band is difficult to achieve in practice at this early stage |
| Bundling of 2.6GHz and 800MHz | 2010–2011 | Both bands are quite likely to be candidates for LTE | 800MHz is more scarce and valuable than 2.6GHz and is therefore a greater priority for operators No real interest in the 2.6GHz band at this early stage |
| Bundling of 800MHz and 900MHz | 2011 | Provide visibility to operators in lower spectrum bands | Delay in awarding 800MHz spectrum as setting up the award of 900MHz band could take some time due to several legal and technical challenges |

Figure 10.2: Additional scenarios to consider for timing of different awards [Source: Analysys Mason]

10.2 Likely impact and implementation difficulty of our main recommendations

We summarise below the list of our main recommendations for the future regulation of wireless access in the 790MHz–3400MHz spectrum bands:

- Topic 1: Promote of mobile broadband
 - Promote and encourage entry of new mobile players (T1-1)
 - Include mobile broadband offers in the BIPT comparison tool (T1-2)
 - Allow terminal subsidy and bundling (T1-3)
- Topic 2: Make authorisations more flexible
 - Consider amending the legal framework (T2-1)

- Introduce greater flexibility into current authorisations (T2-2)
- Introduce greater flexibility into new authorisations (T2-3)
- Introduce spectrum trading and review the current Belgian legal framework in order to include notification to BIPT when spectrum is traded in high-frequency bands (T2-4)
- Topic 3: Digital dividend
 - Allocate the sub-band to telecoms services (T3-1)
 - Reach a decision through cooperation between competent NRAs (T3-2)
 - Develop a new spectrum plan for UHF bands IV and V (T3-3)
 - Adopt a cooperation agreement with the Communities regarding coordination of broadcasting frequencies in order to facilitate international coordination to free the sub-band (T3-4)
 - Award spectrum on national basis in 2011 (T3-5)
- Topic 4: Assignment mechanisms (no specific recommendation)
- Topic 5: Renew of 2G authorisations
 - Award the 900MHz spectrum as early as possible and award the 1800MHz spectrum at a later date, potentially coupled with the 2.6GHz band (T5-1)
 - Extend current 2G authorisations until 2015 and then re-award 900MHz and 1800MHz separately (T5-2)
 - Set the price for 2G authorisation renewal until 2015 based on historical prices and calculate the reserve price for 900MHz and 1800MHz spectrum award, depending on supply and demand for this spectrum (T5-3)
- Topic 6: Assess frequency assignment to the fourth 3G player
 - Reserve for a potential new mobile operator a 2x5MHz block in the 2.1GHz band and a block of 2x5MHz in lower band frequencies (T6-1)
 - Launch the award mechanism for a 3G authorisation as soon as possible (T6-2)
 - Award the fourth 3G authorisation at a price of EUR20 833 per MHz and per month (T6-3)
- Topic 7: 2.6GHz authorisation award
 - Assign the spectrum based upon the ‘fixed’ plan of the ECC Decision (i.e. 2500–2570MHz and 2620–2690MHz for FDD and 2570–2620MHz for TDD) (T7-1)
 - Wait for a real demand for spectrum before awarding 2.6GHz authorisation (T7-2)
 - Award the 2.6GHz spectrum by using a combinatory clock auction (T7-3)
 - Use a lower reserve price than the suggested EUR500 000 per MHz, especially for unpaired spectrum (T7-4)
- Topic 8: Low power GSM in the 1800MHz band
 - Use the DECT guard band for local GSM networks (T8-1)
 - Make available the spectrum using a licence exempt regime (T8-2)
- Topic 9: Microwave fees
 - Reduce microwave links tariffs significantly (T9-1)

We provide below a high-level classification of the suggested main recommendations in terms of:

- likely impact on the market development,

- difficulty of implementation, in terms of cost, timescale, legal complexity or political implication and likelihood of success.



Figure 10.3: High-level classification of suggested main recommendations by impact on future regulation development and difficulty of implementation¹⁵⁷ [Source: Analysys Mason]

The classification provided, although obviously subject to debate, is aimed at defining intervention priorities

- recommendations with highest impact and lowest difficulty of implementation: quick wins with highest priority: T1-3, T2-3
- recommendations with lowest impact but lowest difficulty of implementation: quick wins with lower priority: T1-2, T2-4, T7-1, T7-2, T7-3, T7-4
- recommendations with highest impact but highest difficult to implement: long-term actions with high priority: T1-1, T2-1, T2-2, T3-1, T3-2, T3-3, T3-4, T3-5, T6-1, T6-2, T6-3, T9-1
- recommendations with lowest impact and highest difficult to implement: long-term actions with lowest priority: T5-1, T5-2, T5-3, T8-1, T8-2.

¹⁵⁷ Each topic is displayed with a different colour

Annex A: Plans for 900MHz band in European countries

We present below the situation in different European countries related to the 900MHz band.

- Austria* In August 2007, RTR-GmbH published a consultation on the future utilisation of the 900/1800MHz frequency bands. Responses will be used as a basis for further discussions. The first of the GSM licences are due to expire in December 2015.
- Belgium* In Belgium, from 1 July 2008, 3G operators holding GSM authorisations are authorised to implement their 3G networks in the 900MHz bands on the basis of the Royal Decree dated 28 March 2007, modifying the Royal Decree dated 18 January 2001 regarding 3G authorisations. The BIPT Council issued a decision on 26 March 2009 on the introduction of UMTS in 880–915MHz and 925–960MHz bands, which specifies channels distribution between operators and technical norms applicable.
- Estonia* A single UMTS 900 licence has been issued to Elisa Estonia, which launched a pilot UMTS900 network in January 2008.
- Finland* In November 2007, Finland became the first country in Europe to allow the concurrent use of 900MHz spectrum for GSM and UMTS services, following a decision by FICORA. Elisa launched UMTS900-based services in the same month, and DNA and TeliaSonera have also announced plans to develop their 3G networks using UMTS900.
- France* ARCEP has liberalised 900MHz spectrum, permitting the existing GSM operators to introduce 3G services at that frequency. The operators are required to return part of their 900MHz allocations in order to make provision for a potential fourth mobile entrant. Orange is already rolling out a UMTS900 network, while SFR and Bouygues Telecom have also been conducting trials. All three operators are expected to use UMTS900 in order to fulfil their 3G licence roll-out obligations. Free Mobile, a subsidiary of Iliad, was awarded a 3G licence in December 2009. In addition to spectrum in the 2100MHz band, it will also be provided with 2x5MHz to roll-out UMTS900 by end of 2012.
- Germany* Bundesnetzagentur has published a discussion paper for comment on the removal of technology restrictions for 900/1800MHz. The regulator is seeking views on whether any reallocation of spectrum is necessary, for example to avoid discrimination or make room for a new entrant.
- Iceland* PTA believes there are no formal or substantive impediments in the GSM Directive (87/372/EEC) preventing it from allowing the use of UMTS

services in the 900MHz frequency bands, and the regulator therefore permits refarming.

Ireland

ComReg launched a third consultation on the liberalisation of the future use of the 900MHz and 1800MHz bands in December 2009, after a first consultation on this topic in July 2008.

Italy

AGCOM has set out measures for liberalising the use of 900MHz spectrum to allow 3G services. A new frequency plan for the 900MHz band will be created, which will allow the existing GSM players a maximum of 10MHz of paired spectrum in that band and set aside a block of 5MHz spectrum for auction to UMTS-only operators or a new entrant. Each GSM operator will be entitled to a maximum of 25MHz of spectrum across the 900MHz and 1800MHz frequencies, which means that TIM and Vodafone will have to release some spectrum in the 900MHz band. Refarming will only be allowed when all operators with 900MHz spectrum are in a position to switch on at least one UMTS carrier in a territory covering at least 20% of the population. The operators will be required to grant national roaming on their UMTS900 networks for up to 60 months to the winner of the 5MHz block of spectrum freed up by the reorganisation of the 900MHz band. After the amendment of the GSM Directive and entry into force of the Commission decision on the 900MHz and 1800MHz bands and the subsequent amendment of the National Frequency Allocation Plan, the Ministry may authorise 3G use upon request.

The Netherlands

In November 2007 the Ministry of Economic Affairs announced its intention to permit flexible use of radio spectrum in a number of bands, including those used for the provision of GSM and UMTS. A “transitional framework” has been drafted to explore which licenses can be liberalised and what (if any) additional requirements are necessary. Refarming issues may be addressed after February 2013 when all licences for in the 900MHz and 1800MHz bands expire.

Norway

NPT has carried out extensive work on liberalising the GSM frequencies. By early 2009, Mobile Norway, NetCom and Telenor, reached an agreement for restructuring the 900MHz band to give them contiguous 5MHz blocks of spectrum. After the restructuring process, NPT will issue new technology-neutral licences for the 900MHz band. The entire process, including the restructuring of the operators’ holdings in the band, is expected to be completed between October 2009 and March 2010..

Portugal

ANACOM has adopted a technology-neutral stance to 900MHz spectrum, which opens the door to refarming.

Romania

In October 2008, ANC issued a draft decision for consultation on the harmonised use of the 900/1800MHz bands, which would permit the operation of UMTS-based services in the current GSM frequencies. The licences of the existing GSM operators would be amended to bring this decision into force. If implemented, this decision would allow GSM-only operator Cosmote to launch 3G services. The draft decision was re-submitted in September 2009 for consultation after confirming that the text aligned with updated GSM Directive.

Spain

In March 2009, the Ministry published a summary of the responses received to a consultation on the topic of reallocation of spectrum amongst GSM and UMTS operators. There was general industry consensus on the need to allow UMTS services in the 900MHz band, but polarised views were expressed on the issue of redistributing existing spectrum assignments. The Ministry has yet to make a decision on the review of existing GSM licences or the liberalisation/refarming of 900MHz band.

Sweden

In January 2009, PTS issued for consultation its decision on the future usage of the 900MHz band. In March 2009, PTS announced approval of the use of the 900MHz band for 3G services, following applications received in November 2008 from TeliaSonera, Tele2, Telenor, Swefour and Hi3G. Hi3G has gained access to 900MHz spectrum for the first time, through re-farming of existing spectrum assignments. However, the Swedish Competition Authority is looking into whether this arrangement may be in violation of competition rules, despite being validated by PTS.

Switzerland

In February 2007, ComCom announced that it would renew 3 GSM licences for a further five years until the end of 2013 (to align with the expiry date of the 2 other GSM licences) and allow the operation of UMTS in 900MHz. ComCom proposed a reorganisation of the three operators' 900MHz and 1800MHz holdings to enable them to develop UMTS900 networks.

In June 2009, Ofcom launched a consultation on reassigning mobile radio frequencies the 900MHz, 1800MHz, 2100MHz and 2600MHz bands and announced that ComCom is considering a re-assignment of the entire Swiss mobile radio spectrum available from 2014 in an auction.

UK

Ofcom initially consulted on the liberalisation of the 900/1800MHz frequencies in September 2007, but could not reach agreement with the operators on the options proposed. In January 2009, it issued its revised proposals for spectrum liberalisation. It believes that an industry-agreed set of spectrum trades is likely to be preferable to an imposed solution, and has therefore given the industry until the end of April 2009 to agree a way forward. If no agreement is reached, then a solution will be imposed that

would permit the introduction of UMTS in the 900/1800MHz bands, and in the longer term allow any technology to be introduced in these bands and at 2.1GHz. O2 and Vodafone, who are the only 2 operators having spectrum in the 900MHz band, would each be required to hand back 2×2.5MHz of their 900MHz spectrum, which would be auctioned as a single lot of 2×5MHz to allow a third operator access to the spectrum. The operators would be given two years to clear and release the spectrum, with the auction taking place a year ahead of the spectrum becoming available. Ofcom's proposals were opposed by the incumbent operators; the UK Government appointed an independent spectrum broker (ISB) to find an agreed industry solution as an alternative to Ofcom's proposal. In June 2009, the Government published the final 'Digital Britain' report informed by the ISB report, along with an impact assessment. It proposed the liberalisation of the 2G (900MHz) spectrum and an exchange of 900MHz spectrum by current holders (Vodafone and O2) for any acquisition of spectrum in the forthcoming 800MHz spectrum auction (at a ratio to be determined following technical arbitration work).

Annex B: Analysis of potential interference from 2.6GHz mobile networks on Belgian and Dutch Radio astronomy sites

We have conducted analyses to predict the sum of interference at each telescope using a reference network of mobile base stations deployed across Belgium. The modelling was carried out considering the mobile emissions generated from:

- the top 5MHz carrier centred at 2687.5MHz i.e. 2.5MHz from the band edge (the downlink channel is modelled at a 5MHz offset to radio astronomy)
- the next 5MHz carrier centred at 2682.5MHz i.e. 7.5MHz from the band edge (the downlink channel is modelled at a 10MHz offset to radio astronomy)

We have calculated the interference from a reference network of 1,600 sites, designed to broadly replicate typical site densities within a 3G mobile network.

The following distribution of sites was assumed:

- Rural sites – spaced on a 8km grid = 421 sites
- Sub-urban sites – spaced on a 2km grid = 694 sites
- Urban sites – spaced on a 1.2km grid = 485 sites

A summary of the technical characteristics assumed within our modelling is provided below.

| <i>RA Radio Parameters</i> | <i>At 5MHz Offset – UMTS at 2687.5MHz</i> | <i>At 10MHz Offset – UMTS at 2682.5MHz</i> |
|----------------------------|---|--|
| FDD Base Station Height | 30m | 30m |
| FDD Tx Power | 43dBm | 43dBm |
| Ant Cable Losses | 2dB | 2dB |
| Antenna Gain | 17dBi | 17dBi |
| ACLR | 45.0dB | 50.0dB |
| EIRP | 13.00dBm / 0.01995 Watts | 8.00dBm / 0.00631W |
| Radio astronomy Height | 35m | 35m |
| RA Interference Limit | -185.94dBm | -185.94dBm |
| Required Path Loss | 198.94dB | 198.94dB |

Figure B.1: Summary of modelling assumptions [Source: Analysys Mason]

We have considered two sensitivity limits for the radio astronomy telescopes:

- -193dBm/MHz or -186dBm in a 5MHz band. This limit is more sensitive than the ITU-R recommendation, which we understand is used in the Netherlands

- -187dBm/MHz or -180dBm in a 5MHz band. The limit as set by the ITU-R for radio astronomy observations.¹⁵⁸

We used propagation model ITU-R 452 to model propagation, diffraction and sub-path attenuation using the ATDI ICS Telecom modelling tool.

From the modelling conducted, we believe that there is an impact on the Dutch radio astronomy sites from the mobile network in Belgium at both 5MHz and 10MHz offset. We have found that the sum of the interference at both radio astronomy sites is greater than the interference limit set by the ITU-R, as well as that of the Dutch regulator.

| <i>Offset (MHz)</i> | <i>RA Interference Limit (dBm)</i> | <i>Interference Sum at Westerbork (dBm)</i> | <i>Interference Sum at Dwingeloo (dBm)</i> | <i>Impact to RA Sites</i> |
|---------------------|------------------------------------|---|--|---------------------------|
| 5 | -186 | -170.11 | -168.35 | Yes |
| 5 | -180 | -170.11 | -168.35 | Yes |
| 10 | -186 | -175.11 | -173.35 | Yes |
| 10 | -180 | -175.11 | -173.35 | Yes |

Figure B.2: *Interference sums calculated [Source: Analysys Mason]*

A more detailed analysis is required to look at whether or not mitigation techniques will be needed at mobile base stations using the top two channels of the 2.6GHz band in Belgium, to avoid interference with the radio astronomy sites in the Netherlands. Such mitigation could take the form of filtering and/or exclusion zones restricting base station deployment in border areas with the Netherlands.

¹⁵⁸ ITU-RA 769-2 – Protection criteria used for radio astronomical measurements.

Annex C: Main milestones of the EU framework

The main milestones of the EU framework related to spectrum management are presented in the figure below.

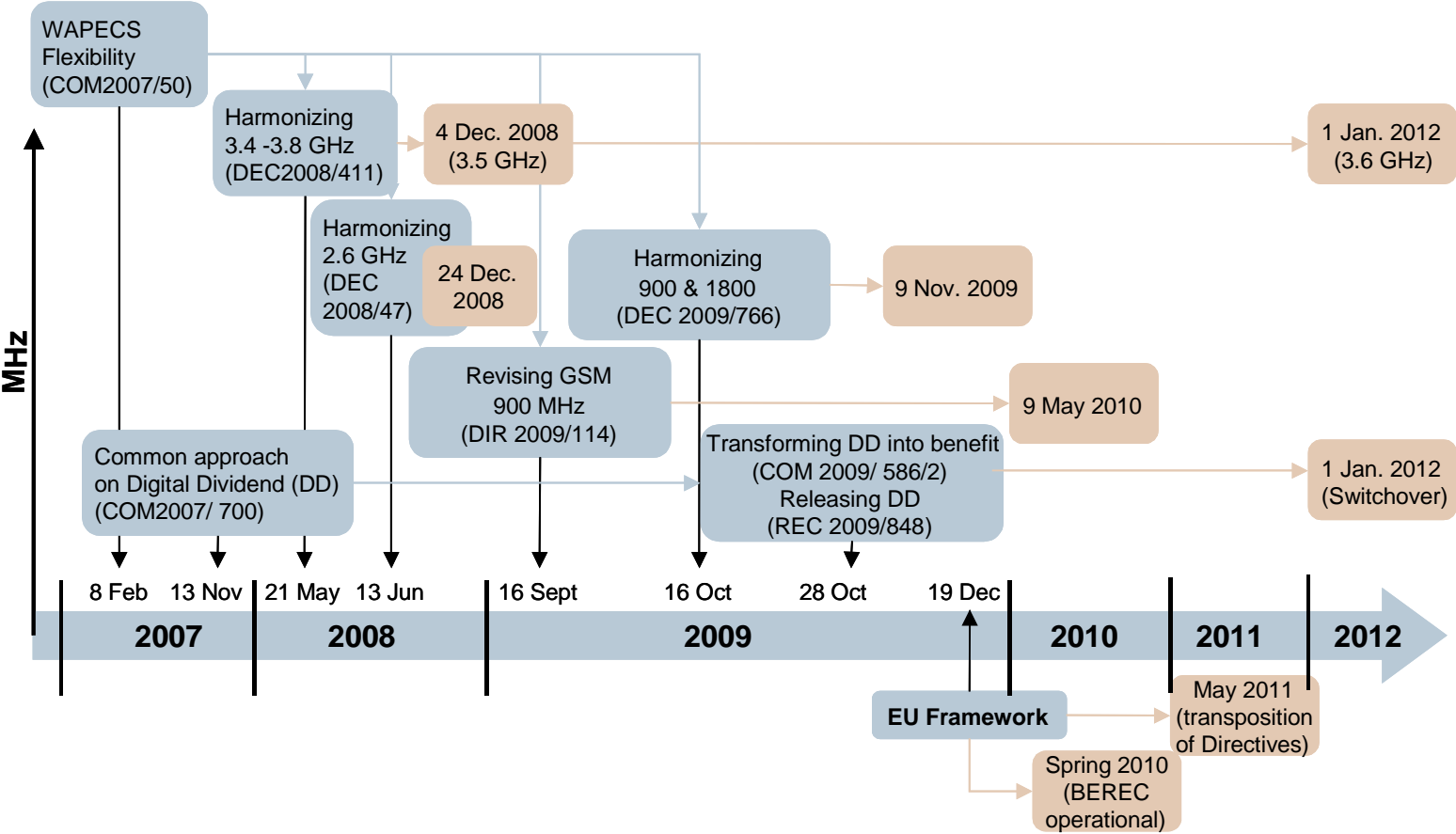


Figure C.1: Main milestones of the EU framework related to spectrum management [Source: Analysys Mason, Hogan & Hartson]